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The International Dry-Farming Congress



OFFICIAL PROCEEDINGS
OF THE
ELEVENTH ANNUAL SESSIONS
EL PASO, TEXAS
1916

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The International Dry-Farming Congress



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V. 11 Continuation.

9-10-18

**The International Dry-Farming Congress
has Held Annual Sessions as follows:**

- 1907—Denver, Colorado.
- 1908—Salt Lake City, Utah.
- 1909—Cheyenne, Wyoming.
- 1909—Billings, Montana.
- 1910—Spokane, Washington.
- 1911—Colorado Springs, Colo.
- 1912—Lethbridge, Canada.
- 1913—Tulsa, Oklahoma.
- 1914—Wichita, Kansas.
- 1915—Denver, Colorado.
- 1916—El Paso, Texas.

**The 1917 Sessions will be Held at
Peoria, Illinois, U. S. A.**



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**FRANK M. BYRNE, President
International Dry-Farming Congress**

Introductory.

Every great constructive or forward movement in history has been based upon and centered around an Idea.

No movement, propaganda or theory founded even partly on error can long stand.

Only truth is permanent, and constitutes a lasting foundation.

Error must and should fall.

Frequently truth itself, embattled from the ramparts of prejudice, doubt and error, temporarily is overshadowed and misunderstood.

An Idea was responsible for the organization of the International Dry-Farming Congress, at Denver, Colorado, ten years ago. The germ, or basis, of this Idea was that a successful system of agriculture could be built upon the principle of retention and conservation of precipitation, and the storage in the soil of accumulated moisture to an extent sufficient for the needs of growing crops—all this in regions where the normal rainfall is too light or too irregular to permit of profitable farming operations under previously known methods.

It is true that this Idea had its origin far back of the date referred to. The theory and practice of dry-farming had been followed in part at least by many successful farmers in widely scattered regions for many years. It remained, however, for the Dry-Farming Congress, its members and co-workers to assemble the complete theory and system, prove out the various essentials and present the compact whole to the world.

Nevertheless, "dry-farming" is decidedly a misnomer. Dry-farming does not mean farming without rain. Thoughtless, but not ill-meaning persons, have wrought harm by conveying the idea that such is the case, and more or less light has been made of the movement at certain times, as would naturally follow if such an untenable theory should be in fact advocated. The name itself originated as a means of contradiction between irrigation farmers and those who were forced to depend upon natural precipitation for their moisture supply. It gradually came into use as the title for the system of agriculture referred to. This was accomplished in spite of much opposition resulting from prejudice against the name, and many attempts have been made to replace it with a title distinctive and descriptive, and at the same time unobjectionable to all. No other name, however, appears to answer the purpose.

Province to Warn as Well as Instruct.—Another erroneous idea that has sometimes been incorrectly attributed in effect that there is no region so dry that it cannot be successfully farmed without irrigation. No claim has ever been made by the Dry-Farming Congress, or by any responsible dry-farmer, that the system known as "dry-farming" would insure a crop regardless of the degree of drouth. There are sections where the rainfall is too light or the soil unfit to ever permit of successful cropping under any method of tillage, without the artificial application of water. There have been seasons when failure could not by any means have been prevented in areas which ordinarily can be made to produce profitably. It is in regions of 12 to 30 inches average annual

rainfall that the system of dry-farming has been able to accomplish the greatest results, in increased yields and prevention of total crop failure.

A Remarkable Record.—That the idea upon which the Dry-Farming Congress is based is firmly founded on truth is shown by the marvelous record the organization has made during the eleven years of its existence. Starting with an attendance of a few hundred earnest souls at Denver in 1906, it has grown and expanded until its active membership reaches a majority of the states of the United States, most of the provinces of Canada, and more than 30 other countries. In normal times its annual sessions are attended by delegations from all these countries. It is a voluntary membership organization, and any person interested in the cause of agriculture may belong. The profound beneficial influence it has exercised upon agriculture in general throughout the regions of light or irregular rainfall in particular clearly entitles it to be classed as the greatest agricultural organization in the world.

The Test and the Proof in 1916.—Nothing could be more clearly or forcefully demonstrate the correct basis of the idea upon which the Dry-Farming Congress was founded than the results of last year's farming operations throughout the Great Plains area, and similar regions. Previous to 1916, two or three seasons of unusually abundant and favorably distributed moisture resulted in unusually large crops being universally grown even by farmers who did not observe the scientific practices of dry-farming. This naturally led to a partial relaxation of effort on the part of many who were lulled into a false sense of security, and who unwisely counted upon a continuation of favorable seasons. But 1916, with its severe and protracted drouths, showed the error of these ways. Not only did the experienced and consistent dry-farmers universally produce larger and better crops than their neighbors who followed ordinary methods, but in countless instances the difference was a difference between total failure and a crop of fair proportions and extra quality. There is no surprise in this. It was bound to come. Periods of drouth and periods of abundant moisture are sure to follow one another as the pendulum of a clock swings back and forth. The only difference is that the swinging is irregular; one or more wet years may be followed by one or more dry years. The lesson is plain. It is only a repetition of many previous lessons.

Sixty Per Cent of the World's Land Area in Need of Dry-Farming.—The fact cannot be too persistently emphasized that over more than half of the cultivated and cultivatable area of the world the usual or normal rainfall is not sufficient to insure the growth of profitable crops except by the practice of the accepted methods of moisture conservation such as are most perfectly exemplified by the members of the Dry-Farming Congress. Thus the vast need for the promulgation of the great Idea, upon which the Congress is based, is readily seen.

A Broadening of Purpose.—At the annual sessions of the Congress, held at Salt Lake City, in 1908, the International Soil-Products Exposition was ushered into being as the child of the Congress. This Exposition was destined to become the annual companion of the Congress sessions. The value of the exhibit method of illustrating facts and results was quickly demonstrated, and the result we now see is an annual Congress, which stands as the greatest agricultural forum in the

world, together with an Exposition absolutely without rival as an educational institution, likewise in the interest of agriculture.

An organization such as the Dry-Farming Congress, attracting as it does, the foremost farmers and teachers of farming from many states and nations, would naturally not be expected to confine its studies and endeavors to any one particular line. Thus we find that the Congress sessions have for several years been devoting much attention to such subjects as livestock, farm machinery, forestry, distribution and marketing, rural education, irrigation, drainage, and other timely topics, including matters of legislation.

Activities Not Restricted to Semi-Arid Regions.—The theory and practice of moisture and fertility conservation, which are the basis of the scientific and practical farming operations this Congress was organized to encourage, demonstrate and promulgate, were evolved out of the needs of the non-irrigable lands in the regions of limited moisture, and the necessities of those courageous souls who have sought to make them available and useful under cultivation. As time has passed, however, it has more and more come to be appreciated that these so-called dry-farming principles and practices are applicable and of exceeding benefit and value in the pursuit of agriculture under wide and varied conditions and circumstances.

Congressman Frank W. Mondell, who was president of the International Dry-Farming Congress in 1915, said in his annual address, delivered in Denver:

"While, therefore, the dry land farmer was the inspiration of our organization and his interests have our first consideration, we welcome to our Congress the farmer under irrigation ditch, the farmer from the regions of occasional drouth, and he who anywhere struggles with problems of restoring or maintaining the fertility of soils. The principles we preach, the practices in agriculture we recommend are of the highest importance and value in attainment of the highest and best use and duty of water in irrigation. The moisture and fertility conservation which our organization has so persistently and earnestly propounded and urged is as essential and effective in preventing the disastrous effects of unusual drouth in regions of ordinarily abundant rain, and in maintaining and restoring the fertility of soils everywhere as in growing of crops on the dry lands. In brief, we teach and seek to encourage thorough and scientific farming—the only kind of farming that pays in the long run—anywhere or under any conditions."

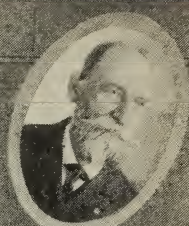
On account of these enlarged activities, and in order to more properly designate the scope of the Congress' efforts, the organization was incorporated under the title of the International Farm Congress. The name "Dry-Farming" has not been abandoned, however.



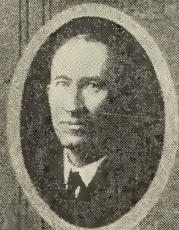
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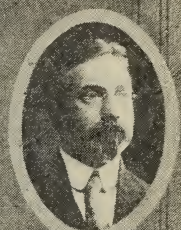
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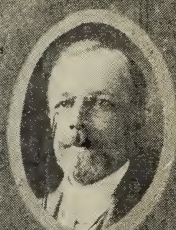
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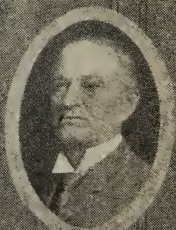
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MALCOM A. FRASER
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PROCEEDINGS

OF THE

Eleventh Annual Sessions

OF THE

International Dry-Farming Congress

HELD AT

El Paso, Texas, October 19-21, 1916.

FIRST SESSION

THURSDAY MORNING, OCTOBER 19.

The Congress was called to order by W. I. Drummond, Enid, Okla., Chairman of the Board of Governors.

CHAIRMAN DRUMMOND:

The Eleventh Annual Sessions of the International Dry-Farming Congress are now convened. We will stand while Doctor Perry J. Rice, pastor of the First Christian Church of El Paso, invokes the divine blessing.

DOCTOR RICE:

O God, Thou Who art infinite in mercy and love and faith, Who art ever around us, guiding us and guarding us, to Thee we come at this morning hour and at the opening of the sessions of this convention and invoke Thy blessing upon us and to pray for Thy rich grace. We thank Thee for all Thou hast given us—for the world in which we live—for this country of which we form a part. We thank Thee, our Father, for these broad prairies, for the rich valleys, for the mountains and hills and for the woods and the plains. We thank Thee for all Thou hast hidden beneath the earth to enrich us and to make us happy. We pray that we may so order our lives that every part of our great country may blossom as the rose and be productive of all that is needed to minister to our comfort and our well being. We come to ask that Thy blessing may rest upon this convention and to pray that the things that may be done and said here shall unite to Thy glory. We pray that we shall be interested in everything that makes the home of Thy people more in accord with Thy divine ideal. Let Thy blessing rest upon all those who rule in authority over us. May we learn that the

good of one is the good of all and that the good of all is the good of one and so may we labor together until every man shall have his due. We pray that Thou will guide us always and unto Thee we will give all the praise through Jesus Christ, our Lord and Savior. Amen.

CHAIRMAN DRUMMOND:

It has been my pleasure as a member of the working force of the International Dry-Farming Congress to be associated with the business men and others of El Paso for the past year. During that year I have also had occasion to make many trips north and east in many states. On these trips, I have noticed two things: One is that the people of El Paso have been misjudged. The city of El Paso and its people are not understood throughout the eastern and northern states. I find that these people on the border by reason of their association with international problems have become trained to see things from a different angle than we do, and they are to be commended for the manner in which they have conducted themselves under trying circumstances. The conditions on the border have not been what they should be, and those very conditions arise from a misunderstanding. We will have in this Congress sessions, representatives from the great Republic of Mexico. We have hopes that these very sessions and this Exposition, in which the Republic of Mexico has placed an exhibit, and to which it has sent its band and delegates, will be the means of removing some of the misunderstandings existing between the United States and Mexico, and that the necessity for the soldiers who escorted us here this morning will not exist much longer.

The work of building this Exposition has been very difficult, due largely to the misunderstandings to which I have just referred, and I believe it would have been impossible to have proceeded with this work had it not been for the city government, the Mayor, his Councilmen, and the El Paso Advisory Committee and the Chamber of Commerce. All these are entitled to the utmost praise for the accomplishment of the results you may see down there in the Exposition buildings. The Chairman of the El Paso Advisory Committee is Mr. George R. LeBaron, who has, I believe, exceeded any record ever made by a local man for the interest and assistance rendered this institution. It is now my pleasure to introduce to you Mr. George R. LeBaron, Chairman of the El Paso Advisory Committee.

MR. LeBARON:

Mr. Chairman, Mr. President, Ladies and Gentlemen:

It is indeed gratifying to witness at least a partial fulfillment of one's hopes.

Speaking for the Local Board, of which I have the honor of being Chairman, I might say that we have been greatly interested in making this, the first meeting of the International Dry-Farming Congress and Soil-Products Exposition in the Southwest, a success. Our object first was to contribute in some small way to the great work of these two institutions in the great semi-arid portions of the United States. This

is the Eleventh annual meeting of this Congress, and the object of the Congress and Exposition, as I understand it, is to encourage a greater knowledge of the business of farming; also to develop safer methods in farming, and for the building of better farm homes. The keynote of both Congress and Exposition is—"Conservation, Cultivation and Education." This, as we all know, is the greatest possible work, for this Western country especially, and we hope that from the sessions of this Congress and the holding of this Exposition, this work will be furthered not only in the West, but in the entire agricultural regions of the United States, Mexico and Canada.

In staging this Exposition, we have been assisted greatly by the Mayor, by the City, the County and the Chamber of Commerce—in fact, I might say by the entire citizenship of the entire Southwest.

Not only is this Congress, which opens today, educational, but the Exposition shows the great work that is being done in the Southwest, or in the western part of this continent.

On the program you will find the names of prominent men in the agricultural world, which will assure you of a most interesting convention. In the Exposition, you will find a number of agricultural, horticultural and mineral exhibits that have never been staged in this part of the country before—in fact, we feel that the Exposition compares favorably with anything that has been staged in the United States this year and we bespeak for it your heartiest co-operation. We ask that you see it and that everyone living in the city, county and entire Southwest see it.

The sessions of this Congress are open to all. Of course, only accredited delegates vote but the public is invited and all meetings will be interesting.

Before concluding, I want to pay a public tribute to the men of my Committee, who have worked with me so loyally. I also want to pay a tribute to Mr. Drummond and his National Board and his co-workers, who have done so much to make the Congress and Exposition a success. Further, I want to thank the Mayor, the Chamber of Commerce, the City and County Commissioners, in fact, the entire citizenship of El Paso and the entire Southwest who have done so much to make this Congress and Exposition what it is.

I thank you.

CHAIRMAN DRUMMOND:

A real live-wire Mayor is not met every day. Some have lots of "pep" but not much judgment. Some have lots of judgment but nothing to start it going. In El Paso, we have met one who has both. He has the initiative to start things and the judgment to keep them going right; and he has been a tower of strength in helping this institution through the difficulties it has met. I now take great pleasure in introducing to you the Mayor of El Paso, who will welcome you to the city. Mayor Lea.

MAYOR LEA:

Mr. Drummond is not only a good Chairman of the Board of Governors, but he is a good kidder.

I am afraid when the word gets back to your homes, it is going to create quite a little excitement to have the people know it takes a regiment of cavalry to get you to church!

It is always a pleasure for a Mayor to welcome good people to his city and I can assure you it is a great pleasure to welcome the delegates of this International Dry-Farming Congress to the city of El Paso. In these delegates, we are welcoming the salt of the earth.

The day has gone by when the word "farmer" can be used in a derisive sense. His figure stands out against the sky as clearly as these mountains of ours. His vocation is one of the most necessary and one of the greatest in this country of ours. In this civilization of ours, the painter paints the beautiful picture, the poet composes the famous poetry, the singer brings forth sweet music, the statesman perfects wonderful orations, and yet, while all these are necessary, the farmer is the man who feeds them, and were it not for the farmer and were it not for the products that come from the soil, there would be no poets, no painters, no singers, no statesmen. We should never forget for one moment the dignity of the man who tills the soil. How many of us in the hurly burly of life look back with pride and pleasure to our boyhood days spent on the farm! How irksome and how tragic it seemed to us then and how much we wanted to get away from it and out into the world and yet today we know how beautiful it was and how many of us would be happier than ever before could we but return to those old days on the farm. We should not forget that we have sprung from the farm, nor the dignity and necessity of the man who tills the soil. He stands out heroic on the face of our civilization.

I am not a native Texan and I am sorry, and the greatest heritage I can give my boys is that they are both native-born Texans.

When I first heard of this country down here, I thought it was the most barren country in the world. I could not see its possibilities then as I can see them now and as I know you can see them and I know this Congress can see them. It is not barren and we who live here realize its future and its potentialities. I believe from your work that sometime, where the mesquite is king, the country will be peopled with happy, thriving farmers. When you, in this organization, do something that makes the home life of the tiller of the soil better, you are doing one of the greatest goods for mankind that can possibly be done.

Naturally, we are proud of this city of ours that has been built down here on the banks of the Rio Grande. The men who came here a long time ago saw the wonderful possibilities of the country and they builded, and builded well, and to them we pay tribute today and ask for guidance to carry forward the work they started in the years gone by.

Speaking of El Paso being misunderstood, that does not worry us at all, because we are building the best little town we can and we are building it all the time. I do not want these delegates who come from

far away to misunderstand us here. We are the same kind of people you are. We have the same thoughts, hopes and ambitions that you have. We do not need war to build a city. It is bound to grow—it cannot help it and we want it to grow with peace hovering over us.

We are glad to have welcomed you here and we hope, when you go back to your homes, you will carry pleasant memories with you of your stay in El Paso. This city with its wonderful future pays you the tribute that you are doing a wonderful work and while you are here, extends the deepest welcome to the people who come within her gates. I thank you and extend to you the heartiest welcome to the city of El Paso.

CHAIRMAN DRUMMOND:

Men like Mayor Lea and the next speaker who will address you would build a city anywhere. These men who have built El Paso here would have built it down the river or up the river had they so desired, and the men who built this city are represented on this platform now. As rare as live Mayors are live Presidents of Commercial Clubs, and it is a remarkable coincidence that we have two live men in one town occupying these positions. Mr. Orndorff is a fit team-mate for Mayor Lea. President Orndorff of the El Paso Chamber of Commerce will now address you.

PRESIDENT ORNDORFF:

Mr. President and Delegates:

It affords me great pleasure to welcome you here this morning. This is the first meeting of this Congress in El Paso. Our commercial body was somewhat skeptical at first on account of the large guaranty this city had to put up for this Congress and Exposition, but I think now, after seeing this magnificent show they have here and the fine body of men who are opening this Congress and who will be here during the week, we are fully repaid and justified for whatever effort we have exercised in securing this affair.

I want to say it has been a great pleasure to have known Mr. Drummond and his assistants and to have worked with them during the year. We feel almost that they are El Pasoans and we hope they will become so much in love with El Paso that they will eventually become citizens of this city. We hate to see them go, and I hope we will again have this Congress and Exposition in this city.

I want also to thank the army for the courtesies extended, for their bands and their participation and I thank the people of Mexico for sending its magnificent band here. I hope the delegates here will thoroughly enjoy and profit by this meeting. We want you to know our city and our people. We want you to know we have educational facilities here second to no city of its size in the United States. We want you to see our great improvements. We hope you will find time to visit the army camps.

I want to especially thank Mr. LeBaron and the Advisory Board for the splendid work they have done in making this meeting a success.

It was my pleasure to appoint that Board and I feel very proud of the fact that I selected men who so successfully carried this work to completion. I hope all of your meetings will be well attended and that you will gain much knowledge from the meetings and that you will enjoy El Paso.

CHAIRMAN DRUMMOND:

Down in the Exposition grounds is a splendid exhibit by the United States Indian Department. It is an exhibit that everyone should visit and study. You will find there the crops raised by Indian farmers and handiwork of men, women and children. We will now have an address by a representative of that Department, Mr. Walter G. West, who is Superintendent of the Southern Ute Indian Agency at Ignacio, Colorado. Mr. West.

MR. WEST:

Mr. Chairman, Ladies and Gentlemen:

On behalf of the Indian Bureau and the Noble Red Men whom I have the honor to represent on this occasion I wish to express most heartily and sincerely our appreciation of the hospitality of this beautiful city and its good people.

The population of our country has become so great and the number of Indians so small in comparison that the First Americans are sometimes almost overlooked. They are little understood by the general public and are too often thought of as fierce savages. In reality they are as numerous as they ever were and they are adapting themselves to a new civilization with remarkable rapidity.

With a view to enlightening the public as to the true status of our present day Indians, we have assembled samples of their products, both agricultural and handiwork, which are now on exhibition at the Exposition buildings, and we are sure that after viewing these you will have a better understanding of the Indians and their struggle to become independent, useful citizens.

CHAIRMAN DRUMMOND:

This is probably the hardest year to hold a Congress or Convention with representative men we have ever had, at least in my memory. Six weeks ago we had acceptances from men in many states and several other countries, outside of the United States, and those men had arranged to be here. Not less than eight or ten governors of states had accepted the invitation to attend, but by reason of the political campaign that is now waging all over the United States, these men have been shoved into the front ranks to try to win their state for their respective parties. Our Secretary, Mr. Welch, has some telegrams and letters along this line. Only a few have been collected and we will now hear from the Secretary a few of these messages of regret.

SECRETARY WELCH:

We have one from the Secretary to President Wilson, Mr. Tumulty, and one from Mr. Roosevelt. Both of these telegrams are quite lengthy and express sincere regret that these men could not be here. We have a letter from Governor Byrne of South Dakota, in which he says:

Hon. Charles McCaffree,
In care of Dry-Farming Congress,
El Paso, Texas.

My dear McCaffree:

With pain and reluctance I have decided to deny myself the privilege of attending the Dry-Farming Congress. It is needless to say I regret this very much, but considering all of my obligations I find it impossible.

I feel a very great interest in the Congress and its work. I believe there are great possibilities in it, and would have enjoyed a couple of days' association with its activities very much. Kindly tender my best wishes and regards to the officers and management, and my regret that I cannot participate in the convention this year. In the future I shall try to do better.

With kind personal regards and best wishes, I am,

Yours sincerely,

FRANK M. BYRNE.

Governor.

Also one from Governor Carlson of Colorado, as follows:

It is a matter of sincere regret to me that the pressure of my official duties is such that it will be impossible for me to attend the International Dry-Farming Congress at El Paso next month.

With best wishes for a most successful convention, I am

Sincerely yours,

GEORGE A. CARLSON.

Governor.

Governor Capper of Kansas, writes the Congress the following message:

September 6, 1916.

I greatly appreciate the kind invitation to attend the Farm Congress on Governors' Day, October 21. It would afford me very great pleasure to be present, but I regret that I shall not be able to do so. That is in the very closing days of the campaign in this state and for that reason I will be unable to get away.

ARTHUR CAPPER.

In addition to these just mentioned, we have telegrams from the Governors of Utah, Arizona, Nebraska, Minnesota, Ohio, Iowa, Illinois, Washington, California and other states expressing their regret at their inability to attend. We have a letter from a former President of the Congress, Doctor Waters, the President of the Kansas State Agricultural

College, in which he also expresses his regrets at not being able to be with us at this time. Mr. Carl Vrooman, Assistant Secretary of Agriculture, wires regrets as follows:

I would enjoy coming to El Paso and think that the importance of the occasion thoroughly justifies the trip if it were not for the fact that I have previous engagements for that whole period.

CARL VROOMAN,
Assistant Secretary of Agriculture.

We also have letters of regret from Governors of three states of Mexico, Chihuahua, San Luis Potosi and Guadalajara, and a telegram from the representative of the Chinese Government.

CHAIRMAN DRUMMOND:

Agriculture is, of course, the basis of wealth of any nation. If it were not for agriculture, there would be no towns nor anything else of a commercial or industrial nature. If it were not for agriculture, I do not presume we would be here or anywhere else. Lots of people who live in towns overlook this. The agriculture of the West has been of slow growth. It commenced modestly and has been attended by many, many failures, and when I say "West," I mean the western part of the United States, and I should include in that the agriculture of Australia, of Mexico, some of the South American countries and Canada. The agriculture in districts where it is necessary to practice irrigation or conservation of moisture in order to succeed is naturally of slow growth and it calls for more scientific study than to raise crops where the Lord lets it rain as often as it should.

In the building up of the agriculture of the West, both irrigated and dry-farming, we have a few men whose work has been of outstanding prominence. Probably the man who has done more study or at least a man who has done as much as any other man in the interest of the agriculture of which I speak, is the present President of this organization. He began his work in Utah and its good effects can be observed there yet. He has been in the Government service and is now the Dean of the Kansas Agricultural College and Director of the Kansas Experiment Stations. I think too high a tribute cannot be paid to this man and his work and the work of men of his type, and it affords me extreme pleasure at this time to have the opportunity of introducing to you President Jardine of the International Dry-Farming Congress.



W. M. JARDINE, Retiring President

President's Annual Address .

PRESIDENT JARDINE:

Of course, my friend Drummond has exaggerated the importance of my activities connected with this organization but it is a courtesy that is always extended to the President of the organization. I have been connected with this organization ever since its inception ten years ago and have stayed with it because I believe in the work in which it was interested.

At the time of the organization of the International Dry-Farming Congress in Denver, January 24, 1907, under the name, Trans-Missouri Dry-Farming Congress, the term "dry-farming" was little known and still less understood outside of Utah and southern Idaho where the phrase had its origin. The term "dry-farming" was coined by the Mormons to distinguish farming above the ditch without irrigation, from farming below the ditch with irrigation.

The man who summer fallowed his land every other year or once in three years in order to store in his soil two years' rainfall for the production of one crop, was considered to be dry-farming. In the case of the dry-farmer the summer fallow served as a means for storing away moisture whereas in the case of the irrigation farmer, the irrigation ditch was used to convey water from streams to his land.

Providing a plentiful water supply was the all important consideration in either system. Farmers in other western states, eastern Washington and Oregon, in California and to some extent in Wyoming and Colorado, were also practicing summer fallowing long before the organization of the Dry-Farming Congress, but had never designated their practice by any specific name.

While ten years ago the meaning of the term "dry-farming" was little understood outside of the states named, sufficient information about the new methods had percolated through the central and western states to arouse a semi-public interest in the question. It was this interest animating a few live citizens of Denver and neighborhood that induced the governor of Colorado to invite delegates from the states west of the Missouri river to meet in Denver to consider the advisability of organizing a congress that should represent the interests of the farmers and new settlers of the great western plains and mountain valleys.

Exact information regarding how to proceed with any degree of certainty to produce profitable crops by dry-land methods was very fragmentary prior to a decade ago, and the primary object for which the Congress was established was to make it a central organization representing the common interests of farmers operating under limited rainfall—an organization which would devote its resources to the assembling, disseminating, and popularizing of the most up-to-date and reliable information on dry-farming methods, and which with its annual sessions should act as a clearing house for the exchange of ideas and

comparisons of results among the leading farmers of the territory interested and scientific and business men. Here the results of experiment station investigations having a bearing upon dry-land farming should be called to public attention and made available for the use of every dry-land farmer.

Later, the institution took on an additional enterprise—the exhibition of farm products produced under dry-farming methods—which, as you will observe, has developed into the largest exposition upon the continent devoted exclusively to the products of the soil. Today the agricultural exposition forms a leading feature of the congress and one of invaluable educational possibilities.

Wonderful progress has been made in the development of the great western plains and mountain valleys during the last ten years through the accumulation and dissemination by the Congress and other agencies of reliable information on dry-farming. The Congress has wielded a great and far-reaching influence in calling the attention of all civilized nations to just what dry-farming means and under what conditions the principles advocated by the institution may be put into effective practice—also through supplying to prospective settlers information on the relative advantages of the various areas open to settlement. At each session of the Congress delegates have been present not only from the central and western states of this country, but from the provinces of Canada, from Mexico, and from many other nations, indicating the widespread interest in the system of farming advanced by the institution. Again this year, as a year ago—even in these troubled times—you will observe many representatives of other countries present. The reports of our past annual sessions have been published in many languages and circulated in many countries of the world. Books on dry-farming have been prepared and published by authors in this field in this country and abroad, and today the term “dry-farming” is widely known and well understood, and accepted as standard. Through its sessions, the circulation of its annual report and the official organ, “The Agricultural Review,” through the messages carried away by the delegates each year, and through its wide correspondence, the Congress has contributed largely to the development of a successful system of farm husbandry for dry lands.

The chief work of the Congress in the past has been along the lines of collecting, correlating, and disseminating the most up-to-date and reliable facts relating to every phase of dry-farm husbandry, while the work of seeking out new facts for farmers operating under a limited rainfall through experimental investigations has of necessity, been left in great part to state and federal experiment stations. Most remarkable results have been achieved by them in this field, for today we have as much or more definite and fundamental information relating to farming under the conditions which prevail normally in the trans-Missouri states, as we have on methods of farming under humid conditions. So well has the work of the investigator been done that today farming under semi-arid conditions is scarcely less hazardous than is farming under humid conditions.

The methods discovered by the dry-land investigators and popularized as a result of the dry-farming propaganda are coming to be recog-

nized as the best and soundest methods to use for insuring successful and profitable productions of crops even in humid areas. While it is absolutely necessary that the dry-land farmer follow to the letter the most approved practices if he wishes to produce profitable yields, owing to prevailing drouth conditions, the humid farmer, because of the occasional drouth to be expected, has found that the methods of the dry-farmer are the ones that can be counted upon to produce the biggest and surest yields under his conditions. Today we see the principles and teachings of this institution being taken up and used in all agricultural regions in this and other countries as a result of the work of the International Dry-Farming Congress, which has led in the movement.

Now that a more or less definite and rather well understood system of farming for dry lands has been developed, through the intelligent and peristent practice of which any farmer may with normal certainty produce profitable crops and thereby obtain a livelihood, and although there is a great deal more to be done along similar lines, the interests of the dry-farmer can best be served by this institution if we in the future will devote the major part of our attention to the bringing about of conditions for a satisfactory home, a permanent rural population, and a satisfactory and wholesome rural life.

Then we must encourage the growing of more livestock in connection with grain farming by the dry-land farmer, in order to provide a market for many of the crops that do best under dry-farming conditions, and in order to eliminate prohibitive transportation rates; also to provide profitable year-round employment for the farmer and his family, and to maintain the fertility of the soil.

Kansas sold 1,345,900 pounds of butter to New Mexico, Montana, Wyoming, Texas, Utah, Oklahoma, and Old Mexico in the year ending June 30, 1916. These states are just as well adapted to the keeping of dairy cows and the production of butter as is Kansas. Everyone of them ought to be exporters of butter rather than importers; they should be selling butter and not so much wheat.

Since the advent of the silo, it has been shown by a number of experiment stations and leading farmers, that by-products, such as fodder of corn and sorgum crops, may be converted into ensilage and thus made to produce palatable, succulent feed in combination with which animals will also consume from ten to twenty pounds of straw daily, and a ration composed of these feeds together with a little alfalfa or some other nitrogenous food, will maintain an animal in good condition at a minimum expense. Where livestock is not maintained, millions of tons of straw—perfectly good feed when fed in conjunction with ensilage—is burned every year, or otherwise wasted. The item of straw alone, if utilized as feed for animals, would produce a handsome return for the dry-land farmer. Such a utilization can only be made through the feeding of live stock.

There are 100,000,000 acres of agricultural lands in the United States that must be farmed, if at all, by dry-farming methods. This land was originally used for the pasturing of live stock, but since the advent of the dry-land farmer, the number of live stock produced in this territory has decreased some twenty-one percent, according to a

recent report of the forestry service of the United States Department of Agriculture, which further states that less than thirty percent of dry-land farmers carry live stock on their farms other than the teams they need for cultivating their land, and a cow or two to produce milk for the family.

The future program for the International Dry-Farming Congress must include bringing about conditions tending toward more satisfactory home life, encouraging the production of more live stock, and providing more profitable work the year around for the farmer and his family.

I wish before concluding my remarks to just express my appreciation for the splendid hospitality that has already been extended to us as delegates by the citizens of El Paso. I was here in July and I want to say I never was entertained more royally and I have never worked with men who have put their shoulders to the wheel and stayed with it like these men in El Paso. I have had quite a lot of experience in working with local committees and boards and they have not all been so loyal and hardworking.

I thank you.

CHAIRMAN DRUMMOND:

I will ask the Secretary if there is anything more before the adjournment. In the printed programs you have, it states the committees will be appointed at this session. The President wishes to appoint these at a later date. Unless there is something else to come before the meeting, we will stand adjourned until two o'clock this afternoon.

Adjournment.

Afternoon Session.

October 19, 1916—2 O'clock.

PRESIDENT JARDINE:

The hour is here when we shall begin our afternoon session. One of the most important sessions, the Roll Call of States, is the one for this afternoon. This is to find out what progress has been made, so it is customary for us to call upon a delegate from each state to review what has been accomplished in his state.

I am going to call on Professor Gilmore, head of the Agronomy Department of the University of California, to tell us what has been accomplished in California since we met last year in Denver. Professor Gilmore.

CALIFORNIA

PROFESSOR GILMORE:

Mr. President, Ladies and Gentlemen:

I feel a little bit like boosting California but am afraid I had better not on account of the limit to which I am held. To be sure we have a state that I think is worthy of great praise.

I would like to tell you first, however, of what seems to me the greatest problems of agronomists in our state. We have about ninety-nine million acres in the state, twenty-eight millions of which are untilled lands. Of these, the irrigation engineers tell us that we can only irrigate about ten million acres. We are now irrigating from three to four million acres, which leaves us about eighteen million acres that must be cultivated under a deficient moisture supply. Thus, while California is usually recognized as an irrigation state, yet the major portions of its areas are dry-farmed. That also carries with it great problems.

We find one great problem is the production of profitable crops under the deficient moisture supply. Under the circumstances the results are that we lose organic matter as soon as cultivation begins on a piece of land. The big problem is to maintain the producing power of the land and get profitable crops from it. The diversification of crops and proper tillage methods and the conservation of moisture are the principal lines of experimental effort in which we are engaged. When I tell you that in all probability we are working under more varied conditions of soil, climate, including humidity and aridity, as well as elevation, than almost any other section, you will realize something of our problems. We are working in sections where the temperature

ranges from 20 degrees below zero to 120 degrees above. We are cultivating crops from 250 feet below the level of the sea up to 5,000 feet above sea level. We are working under rainfall conditions varying from 1 inch to about 18 inches.

Some progress, however, is being made, especially in relation to the maintenance of the organic matter of the soil. Results of experiments with the soils of the western states show that they are more replete in the so-called cellulose destroying bacteria than the soils of eastern states. Of these soils, we find these bacteria are more plentiful in California soil, medium in Kansas and very few in Maryland soil. That throws some light upon the loss of organic matter in our so-called deficiently watered soils as we cultivate them and one of our greatest problems is in maintaining that organic matter contained in the soil and at the same time, getting suitable returns from the land. As bearing upon this problem of maintaining the crop-producing power, you may have noticed that ten or twelve years ago, we were producing something like three million acres of wheat, while now we are cultivating about 400,000 acres of wheat. The wheat area has gone down very rapidly in California, but the barley area has increased. It requires richer and better land to produce wheat than barley. That is in a measure along the line of this problem of maintaining the crop-producing power.

Our experiments in fertility, in the rotation of crops, in the combination of livestock with the production of forage crops, the reduction of large areas, or the dividing of the large farms, are all in line with the progress of meeting this situation, and while California is in no sense going down in the value of her dry lands and crops, yet I mention this in connection with the wheat area. California is passing through the transition stage, from the typically mining and fruit stage to a more diversified agriculture. I think the prosperity of all the states is correlated very largely with the diversity of their agriculture, and while just now California's most valuable and extensive crop is a luxury, that is to say fruit and nuts, yet we are increasing the cereals and other crops very rapidly.

I thank you.

TEXAS

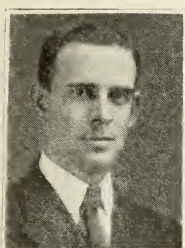
PRESIDENT JARDINE:

I will next call on Professor A. H. Leidigh, of the Experiment Station at College Station, Texas. Mr. Leidigh is a product of Kansas and was connected with the Government for a good many years. I am sure we will be glad to hear what has been done in Texas since we met last.

PROFESSOR LEIDIGH:

Ladies and Gentlemen:

I am pleased indeed to answer the roll call for Texas. I feel that nothing too good could be said for Texas, providing, it is not misleading.



We want everybody to know Texas and to come and live and be prosperous with us, but we invite only those who are willing to be guided by the plain facts with reference to our greatness.

Texas people, and therefore Texas, are in good condition. We have a fair crop of cotton, which is selling at around \$100.00 per bale. Our stockmen as usual are thrifty. Wool and mohair are bringing very satisfactory prices and the cattle business is holding its own.

Texans, however, are not a self-satisfied people.

We are young and healthy and are ever endeavoring to advance. Aside from providing means of existence, we, as a people, are more concerned with education than with anything else. We are endeavoring to develop an educational system that is adequate from bottom to top. In addition to a state school fund of about \$8.00 per pupil, there is a special appropriation made by the state of \$1,000,000.00 for the public free schools and this amount will likely be doubled another year. Texas, I am pleased to state, is no longer penurious with her institutions of higher learning. All of them have for the present biennium received ample support for their purposes. Our Agricultural College is growing and is serving its purpose as never before. The Texas Experiment Station is solving the problems of the farm through a system consisting of a central station at the college and 13 sub-stations located in as many agricultural sections of the state. The results obtained by the station are not only taught in the college, but are carried to the people of the state through the medium of an extension service. The county agents which constitute an important branch of the extension service, are serving a wonderful purpose. They are enabling our farmers to do many things, which they were unable to do a few years ago, and much greater results may be expected of them in the future.

Until recently, we had two general classes of agricultural people, namely, the crop farmer who did not grow live stock and the stockmen who did not grow crops. As a result of the activities of our college through its station, teaching and extension services, our crop farmers are beginning to grow live stock and our stockmen are beginning to grow crops, so that the state is fortunately drifting into stock farming, as the predominating type. To this change we attribute much of our general prosperity.

Texas, therefore, is going into the winter in very good condition and is not in condition to complain.

We are glad indeed to have the International Dry-Farming Congress hold this meeting in Texas and we hope that in due time we may have the pleasure of another annual meeting in this state.

PRESIDENT JARDINE:

We are all for Texas!

I am going to call on Utah next. Utah is represented here by Carlos L. Dunford, who is a member of the Agricultural staff of the Agricultural College and Experiment Station of that State. He will tell us something of what has gone on in Utah, the state in which the term "dry-farming" had its origin. Mr. Dunford.

UTAH

MR. DUNFORD:

Delegates and Friends of this Eleventh International Dry-Farming Congress:

It is a pleasure to be with you again and a greater pleasure to have the privilege of answering to the Roll Call for the State of Utah.

In traveling west and southwest over portions of the states of Utah, Nevada, Arizona, California and Texas to El Paso, it being my first trip to this city, I was somewhat astounded and have since pondered over in my mind—what is the solution? In looking out of the car window, the eye stretches over vast plains for miles, seeing nothing but what Nature has planted. The native vegetation of each state seems to stand up in defiance, saying "It cannot be done. We were here first and here we stay." Gentlemen, we have a mutual problem to solve in bringing these vast plains up to their fullest efficiency.

It is not my intention to leave the impression that all is vast and dreary. We all know differently. We have our flower beds, made possibly by sparkling streams and rains from the heavens, dotting our states. But vast portions are still wild. As our population increases, the demand for a greater tillage acreage will also increase and as these two increase, the solution of the problem will increase. Now, I am no prophet, but I am a firm believer in man and with the assistance of Providence, we shall see the conquest of the desert come as the population demands. Our sturdy pioneers never said "It cannot be done," nor in this day are the offspring of these conquerors, young men who have found the need of scientific study and who have studied and today are solving agricultural problems that years ago were seemingly impossible, going to say "It cannot be done."

Gentlemen, we are just as sure of reclaiming the desert as man lives. I feel that some of the audience is saying "Let us hear what Utah is doing toward this great work." Well, gentlemen, here you have it for a few important projects. Utah has millions of acres of land adapted to dry-farming. Likewise in the state, there is considerable

land that can never be farmed successfully without irrigation. Where dry-farming is possible, it has gone from the experimental stage, for Utah farmers have been dry-farming successfully for over thirty years. At our co-operative sub-station at Nephi, cereal investigations are being conducted, improving and adapting the cereals for Utah's dry land, soil and climate. In localities where a small amount of irrigation water would make farming possible we are bringing in artesian wells that are proving very successful and, in some cases, changing our non-producing dry-farming lands into very productive irrigated lands. In southern Millard County we have several of these wells now in operation. One I have in mind is supplying 325 to 375 gallons per minute. I look forward to the time when thousands of acres will be reclaimed in this way. At Logan we are carrying on experiments with different crops to determine the highest efficiency and the most economical use of water. The data that is being obtained from these experiments is going to be of great benefit to our farmers. In the past, and in some instances at the present time, Utah farmers have injured themselves, as well as their neighbors, through ignorance by over-application of water. As in Utah, the same conditions exist in the above-named states. Land is abundant; water is scarce, but we must educate ourselves to use water, whether it comes from above, surface or below, in the most economical way.

In almost every case the farmers throughout Utah this year have had a successful year. Especially is this true where proper tillage methods have been carried out. Utah is on the map like most of the states of the Good Old West. Let us continue to work unitedly until we have flower gardens where vast plains now stand.

PRESIDENT JARDINE:

I am going to call on Arizona next. Mr. Heard of the Experiment Station at Tucson will respond for Arizona. Is Mr. Heard present? I will next call on Arkansas. Has Arkansas a representative here? Colorado is next on the list and I will call on Mr. T. C. Lippitt of Fleming, who will give the response for that state.

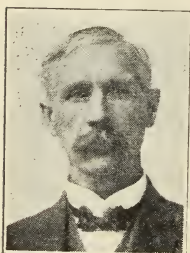
COLORADO

MR. LIPPITT:

Mr. President, Ladies and Gentlemen:

I hope you will excuse my crude remarks because this is out of my line, so don't compare my few remarks with those of the man who has been talking to you.

The thought I bring before you, the keynote, is "Conservation" for us in the semi-arid districts. Many have talked on this thought but I will go a little further and try to bring it to you in a plain farmer's way. In our part of the country, we have the irrigated district and then we have the dry-farming district. I am on the dry lands, but we cannot get along without a certain amount of irrigation. When you go out on these plains, I scarcely think you will have success without the principles that are taught us in dry-farming, but you must have moisture and that must be distributed over the territory. We must have irrigation first and then we will have some rain, but the idea is to conserve this moisture. Today that requires much thought and care and attention. In our orchards, we make what we call dead furrows, and any time we have excessive moisture, the water is put on the trees. In cultivating our soil, we must stir the soil early and disc and double-disc it and keep on stirring it.



I will give you a few thoughts on what we are doing in Colorado in my own particular section. When I went there, sixteen years ago, our little town had two stores and a little elevator. We did not have a station, no church, nor anything like that, and now we have quite a nice \$2,500.00 church, a \$7,000 school house, a half dozen stores, two good elevators, and last year, from July 1915 to July, 1916, we sent out 228 cars of wheat, 22 cars of corn, 4 cars of rye, 4 cars of potatoes and 50 cars of hogs. It is a crop-producing country.

I am glad to be with you people and I thank you for the attention you have given me.

PRESIDENT JARDINE:

I wish we had present more farmers like Mr. Lippitt. This institution has always encouraged the attendance of farmers and encouraged them to engage freely in the discussions and in presenting their experiences, etc.

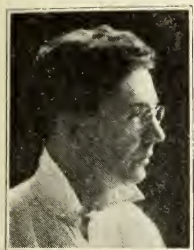
I am now going back to Arizona. I had overlooked the fact that we have a real live wire from Maricopa County, Mr. Harry Welch, Secretary of the Phoenix Chamber of Commerce, who will answer to the roll call for that state. Mr. Welch.

ARIZONA

MR. WELCH:

I am sorry Mr. Heard is not here to tell you more in detail what

Arizona is doing but I feel it would be unfair to you not to tell you of some of the steps that are being taken there to make the best use of the desert and also of lands that have been brought under irrigation.



One of our friends said the desert lacked forage. In Arizona we have been trying to make the best of the desert as it is and in a great way we have been very successful. We find several of the desert plants are very useful for fibres, for gums, etc.

Then we have taken up the matter of range conditions and the re-seeding of the ranges with the natural grasses and also improving the quality of the stock being fed on the ranges.

The establishment of additional dry farms in different parts of the state has taken great strides during the last year, three or four additional new farms having been located. The state has put on the market a lot of the lands which were turned over to the state when it was admitted to statehood and those lands are being offered to the public at a very attractive figure.

The State Legislature also provided for the establishment of some water exploration stations, and the State University has taken up this matter with the idea of finding localities most suited to pumping propositions.

The attention to live stock in all parts of the state has been very marked. Eighteen months ago in the Salt River Valley there were about 16,000 dairy cows and at the present time they total something like 40,000.

Another feature on which we are working there and to which we are giving a good deal of time and attention is the matter of marketing. In Graham County they have accomplished much in this matter and in our own county, we went into co-operation with the United States Government and selected a man to keep in close touch with the cotton growers. This action has resulted in increasing the yield per acre at least 15% and we have a still better quality of cotton than we had a year ago.

There is one other feature I believe we would appreciate very much in Arizona, and that is the interchange of information. In my work as Secretary of the Chamber of Commerce at Phoenix, we have had the very closest and warmest kind of co-operation from all parts of the state. I have also gone outside of our own state institutions for information. The Universities in other states have all been very liberal in giving us the benefit of their information. I believe, if we want an idea or object carried out still further, it would be of great help to the farmers to give them additional information. Some of the information we have been able to give our farmers has been supplied by institutions outside of my own state.

Mr. Heard could tell you a great deal more about what is being done, but I think these few points will give you some idea of a few of the things we are undertaking.

PRESIDENT JARDINE:

I am next going to call on Mr. Bruce Wilson to speak a word for Kansas. Mr. Wilson is a modest chap but he is responsible for that big exhibit over on the Exposition grounds. I think we will have that cup this year. I am going to have Mr. Wilson tell you a little about what has been going on in Kansas among the farmers of the state.

KANSAS

MR. WILSON:

Mr. President, Ladies and Gentlemen:

As to the general progress of Kansas the past year, I feel that much progress towards better farming has been made. The fairs held the past season all indicate that farmers are paying more attention to good crops and better live stock. The grain shown indicates that farmers are following the recommendations of the Experiment Station in regard to varieties best adapted to their sections of the state. The live stock contests consisted of better bunches of colts and cattle than in the past. As to experimental work being done in Kansas, I desire to mention a few things that will interest the dry land farmer.



The Kansas Experiment Station is at present conducting what is known as co-operative variety tests of sorghums. The object of their work is to determine the best varieties of grain and forage sorghums for the various parts of western Kansas. These tests are conducted by farmers on their own land, under the supervision of the Agronomy Department of the Experiment Station. So far a variety known as pink kafir has given the best all around results. The milos, both white and yellow, do well in northwest Kansas. Both mature early, a character that is important in that section because of its shorter growing season. Of the saccharine sorghums the western strain of Red Amber and Western Orange are giving the best results.

Another experiment of much importance and one that is giving definite results is the testing out of four varieties of wheat; Turkey, Klurloof, Pedigree 706 and Pedigree 762; the two Pedigree varieties were developed by the Experiment Station at Manhattan several years ago. These varieties are being tried out in co-operative variety tests throughout the wheat belt. While a large number of these tests are in

central Kansas a sufficient number are in the dry land districts to show what these varieties will do in the region of light rainfall. In an average of the tests conducted the past season the Pedigree 762 outyielded the wheat grown by the farmer by four bushels per acre. This variety ranked first in yield in practically every test. It has made the same record in practically every test for three years now. In each of the years, 1914 and 1915, it outyielded the home grown seed by four bushels. This wheat is a strain of Crimean wheat of the Turkey Red type. It is 3 to 4 days earlier than any other variety, stands up well and is a good milling wheat. Seed of this variety will be available to all farmers within another year.

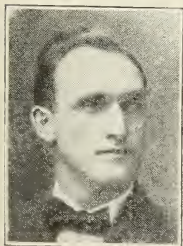
PRESIDENT JARDINE:

I am going to call on Mr. A. Daane, Agronomist of the Oklahoma Experiment Station, to tell us what has been accomplished in that state during the past year. Mr. Daane.

OKLAHOMA

MR. DAANE:

As a representative of the state of Oklahoma and also of the Experiment Station located at Stillwater, I have a few points I think will be of interest to you that I would like to bring out in the few moments allotted to me.



So far as the Experiment Station and its work are concerned, I will say that the past year we have been conducting a number of experiments at the Station, that we think will be of great value to the farmers of the state. These experiments are a series of plots on our Experiment Station which take up the use of fertilizer together with the rotation of crops.

The use of fertilizer and the rotation are of three different kinds, that is, they are three distinct experiments connected with this one large experiment. The rotation takes up primarily a four-year rotation of a grain sorghum, a small grain, cotton and a legume. In our system we have a farm on which live stock will be the principal product of the farm, another that might be said to be adapted to the farmer who is depending entirely on grain crops or field crops and with little or no live stock on his farm. Then

a third would be for a farmer who expects to have diversified farming, some live stock and some grain.

The fertilizers that are used where live stock is the main feature of the farm are the return of the residues of the crop after being used, of course, by the stock. On the one where the farmer is growing small grains, or just growing crops as the main feature, we have crop residues such as the return of stalks and straw and enough of the grain to be equal to about one-third of the crop,—that is the fertilizing element contained in one-third of the grain. Then for the third or diversified farming system, some of the barnyard manure is returned to the farm, together with some of the crop residue.

To go with this, we have also started a rotation, taking up grain sorghums, a small grain and cotton. Then we have also another three-year rotation including a legume, that is a grain sorghum, and a small grain and cowpeas as a legume. Then we have also started a continuous culture experiment of cotton, sorghum and oats. We have also had a continuous culture experiment going on for twenty-three years with wheat. Also there is being conducted a breeding experiment with grain sorgums and with kafirs to find out what type of head will yield the greatest returns to the farmer, that is in connection with the selection of the right type of head in kafir.

We also have varios variety tests of oats, and of wheat and of rye and the grain sorghums, and at the present time there are two experiments going on in connection with Sudan Grass, one in regard to the best rate of sowing, and one to determine the best stage at which to cut Sudan grass for hay.

We have an Extension Department, which, at the present time, is composed of about 100 men and women, about 65 of these being county agents. We hope, by the first of January to have a county agent in every county in the state. We have four district agents who supervise the work of the county agents. We have an office force of about twenty people. There are six district agricultural schools located in various parts of the state. These schools are secondary schools.

I wish to emphasize one other feature in regard to agricultural education in the state of Oklahoma, and that is the law that provides for free county and township fairs in the state. This law provides that commissioners in a county can levy a tax that may be used to defray the expenses connected with a free county or township fair in each of the counties having county agents. I thank you.

PRESIDENT JARDINE:

I am now going to call on Mr. Charles McCaffree, Immigration Commissioner of South Dakota, who is representing that state at the Congress and Exposition. Mr. McCaffree.

SOUTH DAKOTA

MR. McCAFFREE:

Mr. President, Ladies and Gentlemen:

I am very glad I can be here to respond for the state I respect so highly, and I regret that Doctor Hume could not make the response this year.

I notice the admonition of the program that response for the states should be confined to progress agriculturally or new things, which are an improvement, and with my usual confiding spirit I follow that absolutely.

Perhaps the most significant event of the year is the passage of an enlarged homestead act going into effect this summer, which permitted every resident now on a homestead to get an additional quarter section, not contiguous and allows any homesteader to take a half section. This made a rush at our Land Offices, where for some time from 40 to 100 filings were made a day at each office. It has taken all the more desirable free homestead land in our state and while perhaps 2,000,000 acres remains, it is of such a character that it should be used for grazing purposes only along with deeded farming land.



South Dakota is given credit with the best enactment to meet the Smith-Lever appropriation made by Congress. It has proved what seems to us to be an effective organization, with several field agents and specialists, working out from the college and also eight new county agricultural agents, and we recognize this as the most significant and beneficial work carried on among our farmers.

Our state is to vote this fall on a constitutional amendment providing for a rural credit system and it is thought this will be enacted into a law. We, of course, hope for beneficial effects from the national rural credit act and a hearing by the farm loan board was recently held in our state. We don't know how the two systems are to be harmonized, but hope for beneficial results. A pleasing and desirable step comes in the organization of several consolidated rural schools. These are increasing to a very considerable extent and we think will accomplish a great deal in making rural home life fuller, more complete and more happy. We are also learning to use our school houses to a larger extent. The common six-hour use for five days, during seven to nine months, is a waste of opportunity and public property.

As to dry-farming, there is a question whether I should report progress. We have not practiced it much, as it is understood by this Congress. The best experience in our state on the lands west of the 100 M, does not indicate that summer fallowing is desirable. Last year the farmer who did not have 35 bushels of wheat and 75 bushels of oats on his land in the western part of our state, would not mention the crop at all. It is difficult to give serious consideration to dry-farming

methods when such results are obtained. That section did not do quite as well this year, but not very far behind. Experiments we have made and the knowledge gained, indicate that the section west of the Missouri River, which is nearly on the 100 M, can be successfully farmed and annual crops obtained of corn, alfalfa and the smaller sorghums with grains in a rotation. The climate and the finest grass in the world indicate that it is a stock country and these crops are just the ones which will develop the cattle industry. There is no one who questions by this time, that the country may be closely settled with the main industries of dairying and stock growing. There has been a continuous movement of cattle into all that section, and there is much more stock there now than there was in the old range days when it was the famous stock range of the world. For the new settler, dairying is proved to be the most profitable, as it brings a continuous income. One of the two banks in a country town in this section I mention, during the month of July, paid cream checks which footed in the adding machine, made a strip sixteen feet long. The general superintendent of a railroad recently told me that between the Missouri River and the Black Hills, a stretch of 160 miles, their one train had averaged 500 cans of cream per day for the summer. That is worth about \$8.00 per can, making an income of \$4,000 per day for what we call a sparsely settled section and from this one product.

I might note a general sentiment in the state which is being encouraged by the Agricultural College, by the Department I have the responsibility of conducting and other agencies, to make a full season's work, to get away from the short season grain crop and make work through the year, doing away with some difficult problems of harvest help, etc.

We have a new thing in which we are considerably encouraged in the promise of a beet sugar factory the coming year. Experiments have been conducted on a considerable scale and in every case our sugar beets have shown a larger saccharine content than any other beet producing country and we are hoping for some valuable things from this.

The higher price of metals and the great demand for them has started a new mining activity. Several new mines have been opened. Those in operation have undertaken larger workings and we are finding sale for minerals, which we have not before marketed, notably tungsten, of which several \$100,000 shipments have been made.

Ours is a new country, much of it homesteaded several years after this century began and we have not learned yet to depreciate the importance of farming, as compared with other industries. It is the one great occupation and source of wealth in our state. We still think of the farmer much as represented in a chromo, which I remember from boyhood, where a powerfully-muscled man of large stature, labeled "the farmer" was supporting on his shoulders the craftsman and artisan, the manufacturer, the banker, the professional man and the merchant and underneath was the legend, "the farmer carries them all."

The product from the soil of 1915 in South Dakota amounted to \$244,966,000, produced by about 77,000 farmers, or an average of \$3,181, as the returns for each farmer. Or, placing it in another way,

it equals \$408 for every man, woman and child in the state, including the Indians, and our bank deposits show a corresponding increase, so that at the last call there was on deposit \$183.33 for every one in the state, big and little.

One of the foremost agricultural writers terms the section bordering on the Missouri, as the backbone of America, in which case we esteem South Dakota an important vertebra and expect it to hold up its proportion of the burden to be borne with 48,000,000 acres of fertile land, which is not yet more than two-fifths developed.

PRESIDENT JARDINE:

I am sure you will all agree with me that South Dakota knew its business when it selected Mr. McCaffree as head of its Department of Immigration. I have no desire to question the veracity of his statements.

I am now going to call on Director Garcia of the New Mexico Agricultural Experiment Station, to respond for that state. Mr. Garcia has been in New Mexico a good many years and knows perhaps more about it than any other one man. Mr. Fabian Garcia.

NEW MEXICO

MR. GARCIA:

Most of you gentlemen I know do not understand New Mexico. I have been all over the United States and have been at different meetings and it has been my experience to find that New Mexico is less understood by eastern people than any other state.

New Mexico, while one of the oldest inhabited commonwealths by Europeans in the union, has only recently been developing its natural resources. This, no doubt, was due, in part, to its comparatively small and much scattered population; to the long distances to the larger populated centers, and to a greater part to a lack of proper transportation facilities. However, New Mexico at the present time is pushing right ahead, and in many lines of agricultural endeavor it is possibly making faster advancement than many of the larger states.

New Mexico is a mountainous country, though it has a number of large valleys and a large stretch of plains country in the east. Much of this large area on the eastern slope is susceptible to cultivation under dry-farming methods. In recent years these large prairie sections are developing very fast in dry-farming agriculture. Because of its peculiar

topography, New Mexico has many climatic and soil conditions which should be considered in our agricultural operations.

In about the center of the state, running north and south, we have the largest valley, the Rio Grande Valley, which is one of the oldest settled portions of New Mexico. Its agriculture is all done under irrigation. On both sides of the Rio Grande Valley there are many mountain ranges of high altitude where much agriculture is going on in the narrower valleys between them. In many of these narrower valleys, agriculture is done by irrigation, though in a number of the higher tablelands large acreages are being cultivated according to the dry-farming methods.

It has been thought that New Mexico's greatest wealth was in its mineral resources. While this is true to a large extent, New Mexico is truly an agricultural state. The state ranks among the highest in some lines of live stock production. It ranks eleventh in cattle, third in sheep, and was third in 1915 in wool production. To give an idea of the amount and value of the live stock and a few of the more important agricultural crops, we gather from the crop reports of the United States Department of Agriculture the following estimates:

Live Stock and Farm Crops Estimates for 1916.

	Number.	Total Value.
Cattle -----	1,090,000	\$43,709,000
Sheep, Jan. 1, 1916 -----	3,440,000	14,792,000
Wool, for 1915 -----	18,620,000	3,537,800
Horses, Jan. 1, 1916 -----	234,000	13,572,000
Mules, Jan. 1, 1916 -----	17,000	1,445,000
Swine, Sept. 1916 -----	101,000	1,010,000
Milch Cows, Jan. 1916 -----	76,000	5,092,000
Corn, Oct. 1916, bushels -----	2,590,000	2,382,800
Wheat, bushels -----	2,160,000	2,764,800
Oats, bushels -----	1,910,000	955,000
Potatoes, bushels -----	810,000	972,000
Hay, tons -----	362,000	4,344,000
Barley, bushels -----	285,000	208,050
Beans, bushels -----	432,000	1,887,840
Apples, bushels -----	357,000	410,550
Pears, bushels -----	30,000	43,800
Peaches, bushels -----	46,000	98,900
	<hr/> 32,470,000	<hr/> \$97,225,540

Aside from this, the output from many of the vegetables, such as celery, cabbage, sweet potatoes, chile, onions, spinach, tomatoes, cantaloupes, water-melons, and many others, will probably amount to more than all of the fruits put together. These figures will give you an idea of our agricultural wealth for this year.

The Experiment Station has had a great deal to do in bringing about the present agricultural conditions in New Mexico. In the past,

the Station has been the center of all the agricultural activities, though its principal function has been and is to conduct agricultural investigations whose results may have a bearing directly or indirectly on the agriculture of New Mexico. The results of these investigations are published in bulletin form, or through the college publications or through articles in the newspapers in the state. Every year over seven thousand letters are answered giving farmers, live stock men, and business men agricultural information they desire.

Some of the more important investigations that the Station has carried on and whose results have been of great value to the agriculture of New Mexico and those that are being carried on at the present time are the following:

Since one of the limiting factors in crop production in New Mexico is water, we naturally have given the study of soil moisture much consideration. In the soil moisture investigations we are trying to get data that will be of value to both the irrigation as well as the dry-farming farmers. Two bulletins have already been published on the study of the relation of soil, water and crop in respect to irrigation and dry-farming. Many and valuable data have already been published in regard to the reclaiming of some of our lands by means of the pump.

The question of the utilization of the grains and forage crops in relation to meat production has received considerable attention in our animal nutrition laboratories and two bulletins are now published on the nutrition of range steers of different ages. These are available to any farmer who may desire them. The results are of great value inasmuch as they bring out some important facts regarding the best age at which steers will put on more meat.

One of the crops the Station has worked with considerably in introducing it into our farms and in regard to getting information on its adaptability at different altitudes as well as on its value as a dairy cow pasture, is the Sudan grass. It has been shown that Sudan grass can be successfully grown in altitudes as high as 6,500 feet. Its value as a dairy cow pasture is most excellent.

Another crop that the Station is investigating with regard to its value as a feed for live stock is the Russian thistle. This year the Station has a silo filled with Russian thistle to be tried as a feed for cattle, sheep and goats. It is also to be tried as a feed in the form of hay. It is realized that it is not naturally a good feed, but it is very resistant to drought and other unfavorable conditions and it grows on the prairies very abundantly. The idea is to ascertain whether it will be worth while to cut it and use it in the winter on our ranges to tide over some of the old and feeble stock until spring.

The need along the line of improving some of our live stock and increasing its value is apparent, for sometimes it brings less per head than that from our neighboring states. As for example, on January 1, 1916, our horses were valued at \$58.00 per head, while those of Arizona, Colorado and Nevada were valued at \$71.00, \$90.00 and \$76.00 per head, respectively.

In the case of sheep, ours were valued at \$4.30, while those from Wyoming, Colorado, Arizona and Nevada were valued at \$5.60, \$5.20,

\$4.70 and \$5.80, respectively. This is probably due to the fact that the buyers have had the idea that our live stock in many instances is not as highly bred as that from the other states. In this way we are losing many millions of dollars every year. Having realized this fact, the Station is doing a great deal toward grading and improving our live stock.

Considerable work has been done in regard to the introduction of better varieties of corn, wheat, and other small grains, and much attention has been paid to the cultural methods of these crops. Better cultural methods are necessary in different localities in New Mexico in order to increase the yields of our crops.

The question of getting a good stand with many of our agricultural crops has been one that has been investigated. Perhaps no other one thing in connection with the growing of the crop is less thought of by the average individual than the germination of the seed and frequently because of the lack of knowledge of how to handle the soil and the water during the germination period, seed come up very poorly.

Along the line of fruit investigations, the Station has a number of bulletins out and already it has thoroughly demonstrated that through their use it is saving the state a great deal of money. For example, in its plum experiments it has been found that practically all of the Japanese varieties are almost worthless as far as a commercial plum is concerned, for the reason that the trees bloom entirely too early to escape the spring frosts. The Experiment Station does not recommend the planting of any Japanese plums except a few trees, and then only in home orchards. In the past, people used to plant a great many of these trees only to be disappointed at the time when they were large enough to bear. To a large extent this is true of the apricots, which the Station has demonstrated are not suitable for commercial purposes on account of their blooming entirely too early in the spring.

The data obtained from the experiments with peaches show that as a rule the early ripening varieties are the latest blooming and the late ripening kinds are the earliest blooming, consequently such varieties as Elberta, Late Crawford, and Salway are not as sure bearers as the Alexander, and Hynes Surprise, which bloom about two weeks later than the late ripening varieties.

Considerable time has been given to the fighting of plant pests. The codling moth is probably the most destructive insect that the apple growers of the state have to contend with. As a rule, the apple growers have been skeptical as to whether or not spraying did any good and consequently they have allowed, in most cases, the orchards to go unsprayed, resulting in about fifty to seventy-five percent of the crop being wormy by the time the apples are picked. The results of the investigations at the Station show that by the proper use of arsenate of lead and the spray pump eighty to ninety percent of the apples at picking time are sound. Due to the difference in altitude and climatic conditions in the state, the Station has found that a different number of sprayings are required at different localities. It has demonstrated

that in the lower and warmer valleys we have about three broods of the codling moth and that these emerge very irregularly during the growing season.

The New Mexico Experiment Station was a pioneer in the investigational work with the famous Denia or Spanish onion, and it has demonstrated that this onion is well adapted to the warmer and lower valleys in New Mexico.

PRESIDENT JARDINE:

I will next call on Dr. V. T. Cooke to respond for Nebraska. Is Doctor Cooke present? Are there any other states that have representatives here on whom we have not called? If not, I believe this concludes that part of the program, and before introducing the speaker of the afternoon, I wish the Secretary to make a few announcements relative to committees.

SECRETARY WELCH:

The President would like the delegates from each state to select one representative to serve on each of two committees—the Committee on Resolutions and the Committee on Nominations. It would greatly facilitate the work of the meeting if the names could be turned in this evening, or at least by the time the sessions open tomorrow morning.

PRESIDENT JARDINE:

The officers to be elected are a President and three Vice-Presidents, and recommendations for those offices may be made to the Committee on Nominations as soon as they are organized.

I am very glad to know that we have present with us Mr. John Fields, who is editor of the "Oklahoma Farmer" at Oklahoma City, Oklahoma. Mr. Fields was formerly connected with the Agricultural College and Experiment Station of Oklahoma and was with that institution, some ten years, I believe. He is a graduate of the Pennsylvania Agricultural College and is now connected with one of the leading papers of the Southwest. I take great pleasure in introducing to you Mr. John Fields.

Address of John Fields

MR. FIELDS:

Mr. President, Ladies and Gentlemen:

I have been very much interested in hearing what those from the different states had to say and it has impressed me with the truth of a fact that has been brought before me more and more as I have lived in this country, and that is that the problems of the development of a given area are, after all, very largely local. In common with the President of this Congress, I attended the first session held in Denver. I remember that I got into trouble there for saying that what we should do was to tell the truth to the many thousands of people who knew nothing of farming, who were being hauled out on the plains from Chicago and other cities and who were inevitably doomed to failure.



I have spent twenty years in Oklahoma and during that time have watched the development of an absolutely unsettled country into a region that will compare, and not suffer in the comparison, with many of the states of the corn belt to the north and east. We have made many mistakes and doubtless we are still making them, and I shall refer just briefly to a few of the foolish things we have done and possibly some of the things that may be pushed upon you. We had, of course, the speculation period and I cannot quite agree that the liar does not serve some purpose because I really do believe that the liar—and I do not use the term disrespectfully, I mean the man who is exceedingly enthusiastic and to whom facts are of but little consideration—has had much to do with the development of the United States. But he gets us into worlds of trouble and I think we have reached the point where we have enough definite information about agriculture that it should be the duty of everyone who pretends to give advice to those who farm to stand up and tell the truth, no matter if it may temporarily appear to get you into trouble with those who may have something to say as to whether or not you get the appropriation you require for your particular branch of the work.

We passed through every feature of speculation in Oklahoma. I have in that state seen the live stock industry absolutely demoralized on three sperate occasions for the simple reason that we failed to produce feed for the live stock on the farms of the state. I am happy to say that during this season as a result of our having realized that regularity of production is the essential thing, we have come through with an abundance of feed crops, an abundance of grain has been produced and we will have no difficulty at all in the maintenance of our live stock industry.

There are so many features connected with agricultural development that I am somewhat at a loss as to what to touch upon. I feel

that this Congress has done much in emphasizing the importance of methods of soil tillage adapted to the localities and conditions under which farming is being done. I likewise feel that neither this Congress nor very many of the Experiment Stations throughout the United States have given the definite attention they should to the development of crops adapted to the varying soil and climatic conditions of different localities. One thing that has gotten us in trouble in Oklahoma has been our failure to realize that, while we have most excellent corn soils all over the state, it is also true that we have an exceedingly punk corn sky about three-fourths of the time. Because the farmers who settled Oklahoma came very largely from the north and east, where corn is one of the most profitable crops, and further, because many land speculators were engaged in getting homeseekers from corn countries, there was the constant pressure for a large increase in the acreage of corn. In 1911 there were 5,945,000 acres planted to corn and that acreage lacked twenty-five million dollars worth of producing enough feed to carry our stock through that winter. The total value of Oklahoma's corn crops during the past six years has been \$125,000,000 less than the cost of production, for the simple reason that we persisted in planting corn on land here corn will not grow. Those who control credits in an agricultural community have vastly more to do with determining the crops that farmers grow than all the agents or government men sent out by the various bureaus and stations.

We are, however, reducing the corn acreage and increasing the kafir acreage. We are doing the things that are necessary to do in order to make certain the regular production of crops under the conditions under which we are farming. The conditions elsewhere are different, such as in South Dakota and further north, but it should be the province and duty and business of everyone who has charge of the agricultural welfare of any locality to endeavor to work out the crops and methods that are suited to the conditions that exist there. And no matter how well methods may be worked out, after a good many years of experience, I have come to this conclusion: that ten years from now certainly half of the farmers of this country will be growing the crops they grow after the same old methods they have always been following. And the problem in the dry-farming region is largely to get them to choose adapted crops that will produce more than some other crop not adapted to that region will produce.

Several years ago the Department of Agriculture conducted an investigation to learn what the farmers depended upon for their knowledge. Something over 3,000 farmers were interviewed and 42% of them did not read anything, but believed their own personal experience was the only dependable teacher. Now, if you can talk those fellows into growing kafir instead of corn on land where corn will not grow, you have made far greater progress than in any other way. Of the other 58% of farmers interviewed, 72% of them depended upon farm papers; 19% regarded the bulletins of the Department of Agriculture and the farmers' demonstration work as the most useful and dependable source of information and 9% regarded each of these sources to be of equal dependence.

I am mentioning these things to give me an opportunity of saying that the United States Department of Agriculture, the agricultural colleges and experiment stations have no peer in the development of accurate, scientific information about methods and sorts of crops to be grown, but when it comes to the dissemination of that information, that is where the real farm paper also does some business. I am in El Paso principally to represent the Agricultural Publishers Association. I am fully aware of the fact that there have been so-called farm papers, edited with the scissors, and published for advertising alone, but there are papers that realize their opportunity and their responsibility and who are spending more and more money for real editorial service for the development of papers that do fulfill their function and bridge over the gap between the experiment station bulletins and actual farm practices.

In my experience in Oklahoma, I have listened to politicians who tell us of the evils of tenancy and I have listened to all of this talk about scientific agriculture and then have had men come to me and say, "Can you not do something that will help us develop in our community a school just as good as they have in that little town over there?" I was glad to hear that in South Dakota they are giving some thought to the consolidation of their schools—schools that will give their children equal educational opportunity with children living in town. That is the real agricultural problem. The solution of this problem will not be brought about by going out and telling the country people how nice it would be if they had better schools. Country people, and I speak particularly of Oklahoma, have made sacrifices for the education of their children such as town people never even dreamed of making. The thing most needed is money. I notice today mention made by two or three of the speakers of the additional help and support they are getting in the way of appropriations for their work. I appreciate their point of view. They need this money in their work. For the last ten years I have made it my business to try to represent the alumni of the public schools. Did you ever hear of anyone trying to round up the alumni of the public schools to try to get an appropriation for the public schools? I have had a notion for a long time that every state ought to spend as much money for the development of a better system of public schools as it spends for the development of higher institutions of learning.

At Memphis, in August, I spoke to the Banker-Farmer Conference. These people have come to realize that the development of the real agriculture of that country is essential to the future of the business of Memphis. They are spending money and they are making progress and I gave them a definition and measure by which they might determine when the work of rural development was on a fair way to completion. Here it is: Do not feel that any agricultural community is developed—that its agriculture is on a safe and sound foundation until any one of you—the merchant or banker in the town that serves that agricultural community—would be willing to move with his family to any farm in that locality and make it his permanent home and limit the education of his own children to the local facilities for education provided there. There is the test of real agricultural development. That

is the reason you find it difficult to get intelligent, progressive people to go on the land and why they find it necessary to abandon this business and move to some town and send their children to school. This may seem remote but is absolutely necessary because rural advancement is dependent upon intelligent citizenship living on the farms and building the homes there. The development of dry-farming more than any other class of farming is dependent upon the ones who want their homes to be their children's homes after them and how is it to be a home unless, available to that home, is every facility for education, communication and transportation that is available to any home in any town in the country? That is the real basis of this agricultural problem.

PRESIDENT JARDINE:

I am sure that Mr. Fields has voiced the sentiments of all of us respecting the most fundamental problem of not only the farmers of the dry lands but those all over the country—the building of permanent homes instead of a tenant system as we have, and making rural life conditions as attractive as they are in the cities.

This concludes our program for the afternoon. I will ask the Secretary if there are any further announcements to make before we adjourn. I would like the opinion of the delegates as to whether or not they desire to hold an evening session. Would you sooner not have an evening session? Could I hear from you on that matter?

A DELEGATE:

In view of the fact that so many are absent, I would move to hold the session in the morning.

This was seconded.

PRESIDENT JARDINE:

It has been moved and seconded, in view of the limited attendance on account of the trip to the Dam, that we postpone the evening session until morning. All in favor of this make it manifest by saying "Aye." Opposed "No." The "Ayes" have it. I hope you will try to be here in the morning. We are going to have room for discussion. We want that because it is in the discussion of papers that ideas are advanced and that we really get the things that count.

We will now stand adjourned until 9:30 in the morning.

Morning Session

October 20, 1916—9:30 O'clock.

PRESIDENT JARDINE:

We have a rather full and very excellent program for this morning. It is represented by leading educators from three of our greatest states. We have with us the President of the Utah Agricultural College, the Director of the Texas Experiment Station, and the Director of the Arizona Experiment Station to speak to us this morning.

The first number on the program will be an address by Dr. E. G. Peterson, President of the Utah Agricultural College. He has had a good deal of experience in Utah and other states and has been connected with a number of our educational institutions in various parts of the country. He is a graduate of Cornell University and also of the Utah Agricultural College. He is doing important work in the state of Utah—the state that has contributed more than any other to this movement—and he is going to give us some idea of what is going on there now and some of the work he is carrying on and I take great pleasure in introducing to you our first speaker of the morning, Dr. E. G. Peterson of the Utah Agricultural College.

Serving the Farmer and Housewife Educationally

DR. PETERSON:

The American system of education is as yet imperfectly adapted to the practical needs of the farm and the home.

This statement is made with full knowledge of the difficulties which the colleges and high schools have encountered, and still encounter, as they have attempted to adjust their courses to the needs of the community. And those who have followed especially the history of the agricultural colleges of America, cannot but be fired with enthusiasm because of the spirit which pervades their institutions—a spirit at once vigorously patriotic and democratic, and imbued with a fine desire to serve.

Yet there is urgent need of these colleges shaking themselves from the inertia which is settling upon them, and again attacking the problems of today as yesterday they attacked the problems of yesterday. They tend to make scientists instead of farmers and housewives. The chemistry they teach in the agricultural



course is much the same assortment of chemical facts and demonstrations as the doctor, or the technician, is taught. The physics taught the girls in home economics is much the same grouping of exercises in physics as is taught the agriculturist and the physician. And so it is with bacteriology, mathematics, biology, and related divisions of science.

Now, every sensible man realizes that chemistry is chemistry wherever you see it, but every sensible person also realizes that there is a wide choice of fact and principle which may make the course largely useful or useless, depending upon the future work of the student. We are maintaining that a student, in order to take the dose of College exact science, which we prescribe for all much alike, must have prerequisite upon prerequisite, until it becomes extremely difficult for those who wish to know how to farm or how to conduct a home to get any more than a small bit of training directly related to their life's work.

I am familiar with the argument that is advanced by the advocates of our prevailing system of instruction, that if the science fundamentals are given the students, together with the mental discipline which comes from conquering difficult tasks, the student easily adapts himself or herself to the problems of the day and satisfactorily conquers them. Such argument is evasion in large part. We can make the immediately practical problems of the farm and the home as exacting intellectually, and a hundred fold more directly serviceable in comparison with the pure science now given in undue preponderance.

We give proportionally too much chemistry, physics, and biology as such, and not enough soils, plants, diseases, remedies, sanitation, and related immediately practical work. We surfeit our girls with chemistry, physics, and other exactions, and do not train them adequately for motherhood.

We force girls to learn meaningless things about the lead compounds, and do not train them adequately in child rearing. This seems to me to be possibly the most notable failure of our whole system of education, and especially of our agricultural colleges. We dilly-dally on the very border line of the intensely practical and intensely serviceable, but have refused to frankly incorporate into our course of study training for motherhood—at once the most important social consideration.

It is stated that 400,000 children and babies die each year in America, and that of this number 200,000 deaths are due to ignorance and, therefore, preventable. Yet we do not teach a girl how to care for a child except in theory. We discuss dietetics in theory, but we do not give our students practice in child feeding. We discuss nursing, but our students do not actually engage in the practice of preparing the food and feeding children. We discuss children's clothing in theory, but the girls do not make the clothing and clothe children in practice. We discuss the Montessori method of educating the child, but we do not give girls practice in the Montessori method. From the time a girl enters our average school of home economics until she leaves she does not hold a child in her arms.

We have avoided the most important aspect of home training.

The question of delicacy sometimes raised here may be ignored as

senseless. It reminds one of the attitude of the thinkers of one stage of our history, who would not deign to look into a horse's mouth to see how many teeth he had, but would consume many hours in learned discussion of the question, quoting at length all authorities but the horse himself.

A course in Mothercraft, I know, should be surrounded by a finer sentiment than that which surrounds our average course in science. There should be no spirit of idle curiosity; but rather a deep, spiritual regard for the subject matter. The Agricultural College of Utah this year, (and first among the public institutions of America, according to my present information) frankly has outlined and is now, very satisfactorily to us, giving work in Mothercraft. Girls are assigned to the work in homes, with the mother responsible in all cases, and the care of the child is undertaken under the supervision of the College physician. Credit is given for the work according to the time spent and the problems encountered. In a practice house, according to our plan, children are brought with their mothers, and each girl is given charge of a child to feed, clothe, instruct it, and otherwise care for it in health and in sickness. There are play hours and work hours, depending upon the age of the child.

You will be interested to know that the response has been immediate. Girls take to the work. It calls for their best effort. It means more to them than the most complete knowledge of the lead compounds. It is our firm plan to enlarge this sphere of our activity, and decrease the amount of work now demanded of girls in the exact sciences.

So, if time permitted, I might enlarge upon the fact that we are making agriculture more exactly scientific than practical. We are becoming as intolerant to new things as were our grandfather teachers when agriculture itself knocked for admittance to our intellectual company. Chemistry itself, which President Eliot humbly taught in the basement at Harvard because it was deemed of not sufficient importance to merit a real class room, is becoming as hide-bound as were the subjects which once refused it admission.

One thing we educators must now acknowledge: learning and education are not confined to educational institutions, so-called. Corporations and private initiative otherwise have recently adopted educational features which will make them worthy competitors of our colleges in training men and women. Furthermore, a farmer's son, if he is to farm for a living, cannot well spend eight full years in the grades, four full years in the high school, and four full years in college. We have got to shake down our courses in high school and college so they meet the needs of today, or they will be shaken down for us by an enlightened public sentiment.

The teacher is no longer a bespectacled mystic, who knows all the vast sweep of knowledge, and mystifies all by his great cunning and his all inclusive wisdom. He is a common workman along with others. The reverence which surrounded him in the past is gone. He must make good, as the man at the lathe, or the manager at his desk. Our educational plans have, in too large a measure, been laid by professional

educators, without sufficient regard to the needs of the people. We have enmeshed the people in a web of educational plan and theory which must be in large measure loosened quickly, or the people will arise and destroy what we have and build anew, according to their needs.

PRESIDENT JARDINE:

I think you will agree with me when I say that when more of our educational institutions of the country are headed by young men like Doctor Peterson, who are not afraid to try new things, we will advance our educational system and develop along right lines not only agricultural but other lines of industry. One of the greatest handicaps to the development of the sim-arid west has come from the fact that men sent into those areas in early days were from farmer families of Missouri, Illinois and other eastern states and they attempted to use methods of growing crops and farming under dry-farming conditions that they had been accustomed to use back east. They could not forget the old methods and there have been many costly experiments because they could not forget the old way of doing things. One of the objects of this organization is to change the mode of thinking of those farming today in the Great Plains regions from that which they brought with them from their fathers' homes in Missouri and elsewhere in the east.

The man who will next address us has lived in the West for a great many years and has become an agricultural authority not only in his own state but all over this country. It has been as a result of his direction and his energy that much valuable information has been brought to light that is now being used in the development of our agricultural resources of the Southwest. Doctor Forbes is Director of the Arizona Experiment Station and is amply qualified to present to us some facts that we can consider seriously here today. I believe this is his first appearance on the program of this institution and we can count ourselves fortunate in having him here today. Dr. Forbes.

The Future of the Range

DR. FORBES:

It is said that about twenty-five years ago Major Powell, of Colorado River fame, speaking from the Pima County Court House steps in Tucson, on the occasion of a visit of the Senate Committee that was looking into the possibilities of water storage for irrigation in the West, said that some day this desert country would be the garden spot of the world. He continued to explain his meaning by speaking of the possibilities of water storage in a country where climatic conditions were peculiarly favorable to the production of abundant crops; where busy populations, clustering around rich mines, would demand the produce created by the irrigation farmer; and where the broad grazing ranges would give rise to great herds of cattle destined to aid in the task of

feeding millions of people throughout the country at large. He spoke also of the unsuspected possibilities of desert plants whose composition and value were not yet known, and whose uses for the benefit of mankind had not yet been discovered.

Major Powell spoke with a prophetic vision far beyond the power of many of his hearers to follow, and we may well imagine the astonishment with which many of them heard his words. Many of these men indeed, coming at an early day into the country, had witnessed first an era of prosperity and then a period of decline. These men—the old cattlemen of the pioneering stage of Southwestern history—had come with the first herds of cattle from Texas and New Mexico into what must have seemed to them a land of plenty, almost bewildering in its beauty and apparently unlimited in its possibilities. Tempted by the great plains waving with grasses as high as the pommels of their saddles, they had multiplied their herds and grown wealthy from the sales of fat cattle that had cost them only the trouble of herding and of driving to the markets that awaited them at the various military posts scattered here and there through the new country. True, they had dangers to encounter, but from what we know of them these were cheerfully risked for the rich reward that lay before their eyes upon the range. With this incentive herds multiplied, sometimes beyond the market demand for beef so that much grass was at times uselessly consumed in maintaining cattle for which there was but tardy sale; and then came the dreaded drought when cattle, emaciated from want of feed and famishing for water, perished by thousands on a range which formerly had seemed inexhaustable. These periods of disaster were followed by periods of partial recovery and by repeated droughts each one more severe than the last, until the culmination of misfortunes came in 1891, when the greatest and most disastrous of droughts bared the ranges and resulted in the loss of probably more than half of the cattle with which the region was stocked at that time. Along with these misfortunes the range itself began to suffer from erosion caused by the quick rush of storm waters from bare surfaces down wheel ruts and along cattle trails, cutting first narrow gullies, which finally widened into great barrancos which lowered the water levels in the valleys and destroyed the possibility of a return of many of the grasses which formerly had occupied the lower and richer grazing grounds.

No wonder that those who had passed through the ups and downs of the early range and had witnessed, not its improvement during the thirty years of their occupation, but its destruction, listened to Major Powell and his stupendous prophesy with skepticism, doubtless considering him a visionary, or at best one whose words could only come true in the very distant future.

Range Improvement Studies.

In due time, however, about the year 1900, the attention of thoughtful men was attracted to the great importance of a study of grazing ranges with a view to their preservation for the sake of the great and increasing value of their livestock products. It was thought

at that time that probably the only and final use of grazing ranges was for the production of sheep and cattle, and these ranges were expected to produce a considerable proportion of the beef supply no longer afforded by the ranges of Texas, Oklahoma, Kansas and Nebraska, which had been appropriated by the oncoming army of homesteaders. An enlightened Department of Agriculture, therefore, and certain experiment stations, took up a study which was intended to enhance the value of the western range, at that time amounting to some four or five hundred millions of acres. Departments of research were credited; specialists were employed for the study of the subject; range reserves of considerable extent were established in Arizona and New Mexico, fenced and kept under observation for the purpose of determining the rate and economic value of the improvements that occurred both naturally and with the assistance of useful seeds sown upon overgrazed tracts of land; Australian land laws and practice in the leasing of large tracts of land for long periods of time were studied; and efforts were made from time to time in the National Congress to enact similar legislation for the benefit of our own Western country. At the same time the Forest Service working with scientific guidance along economic lines, greatly improved the carrying power for sheep and cattle of many millions of acres of range country and proved out the principles of range conservation and control. The result of some fifteen years of work within the forest reserves and with the experimental range reserves near Tucson, Arizona, and Mogollon, New Mexico, has been a successful demonstration of the fact that by controlling the time and amount of grazing upon range lands they may not only be saved from destruction, but may be improved even while supporting considerable quantities of livestock. Viewed as a simple grazing proposition, therefore, the future of the range, under proper regulation, is not a discouraging one; and it is not unreasonable to believe that these areas in future will yield, not a decreasing, but an increasing return in livestock values, estimated by some careful observers at probably twice what has until recently been realized from this source.

Successful Indian Stockmen.

If it were possible to secure the right kind of land legislation still further improvement in grazing practice might be realized, illustrated, for instance by the grazing practice of the Papago Indians of southern Arizona who, through the accident of their situation, have developed one of the most successful systems of range management to be witnessed anywhere. These Indians, during the dry and nearly rainless season from January to June, each year, live in the foothills where springs of water are to be found and where their cattle graze upon the browse and the dry grasses left over from the rainy season. When in July the summer rains begin and water for their stock accumulates in the water-holes in the valleys, these Indians load their women and children and their worldly possessions into their wagons, gather their cattle and horses, and migrate, often to a distance of many miles, into the valley bottoms where springing grasses and occasional rainstorms afford feed and water for their herds and for themselves. Here they remain for a period of

months; and when the rains fall they migrate once more back to the foothills, affording rest for the valley ranges and again making use of accumulated feed in the foothills. This is an illustration of the possibilities of alternate use and rest of grazing ranges, for, although these Indians have occupied this country for many years, their ranges remain in good condition, while those of white men in adjacent country have been over-grazed and ruined by a continuous and grinding occupation of the territory occupied by them. Legislation of any kind, therefore, which will secure alternate use and rest of grazing country, will conserve and greatly increase the productive possibilities of that country. This has already been secured within the Forest Reserves. Let us hope that ultimately the benefits of this practice may be extended to the unforested grazing ranges of which many millions of acres yet remain throughout our Western country.

The Coming of the Dry-Farmer.

But as time has gone by yet other possibilities for the development of the range have made their appearance. Adventurous settlers, favored occasionally by unusually wet seasons, as in the year 1905, have attempted to put into practice the principles of dry-farming as they are known and practiced in the Great Plains region and in the Rocky Mountain valleys further to the north. During the unusually wet winter of 1904-5, just mentioned, many accidental roadside plantings of barley, where teamsters had fed their animals, awakened the idea of cultivating to advantage the lands which until then had been used exclusively as grazing ground; and so the nester began to work his way through the land, selecting the most favorable spots; availing himself of every advantage in soil, floodwater supply and wells; making many failures here and there, but learning by each failure, until at last, after something over ten years of experimenting in Arizona, and for a longer period of time in regions further east, we are beginning to see the way through the problems that confront the dry-farmer in this region of extremes—of hot summers, of sharply frosty winters, of unusual isolation, of precarious and uncertain rainfall and of usually extremely arid atmosphere. Beginning with a few scattered homesteads, at first regarded with aversion by the cattlemen in whose ranges they appeared, the number of homesteads has increased until now, in formerly grazing valleys, the old overland roads are so interrupted with fences that the traveller can no longer follow them; and the once grassy expanses of valley country are now dotted with squares of cultivated ground, often waving with the hardier and more drought-resistant crops that have been found adapted to the region. Among the principles underlying successful culture in subtropical, semi-arid portions of our country, receiving approximately ten inches of rainfall, we may note in passing the importance of close connection in point of time between the receipt of the moisture supply and its utilization by the growing crops. Soil mulches, so important and so effective in regions further to the north and to the east, are not so effective under the extreme climatic conditions, more particularly of southern Arizona, and recent work there has demonstrated the importance of devising the closest possible connection between the rainfall and the planted crop, even where the soil has

been thoroughly and deeply prepared and the mulch maintained. In this way only can the maximum possible use of winter or summer rains be made. I cannot better illustrate my meaning than by citing the ingenious practice of the Moqui Indians in northern Arizona. These Indians, with a short growing season for corn, appreciate the necessity of planting not later than June in order to harvest their crop before frost. If, therefore, the rains are late, they carry water to their fields, moisten with it handfuls of clay, plant in each handful two or three grains of corn, and thrust the wet mass deep into the sandy ground. The corn thus moistened springs into life and pushes its way to the surface with the help of the handful of moist soil; then the belated rains come and the corn, with a running start, pushes on to early maturity. Similarly, the dry-farmer must find it to his advantage to plant as early as possible upon the moisture supply accumulated during the winter season. Kafir corn and milo maize, planted as soon as danger of frost is over, or even taking a chance with frost, have given far better results under Sulphur Spring Valley conditions than when planted one or two months later, even when the mulch was carefully maintained. Working with the summer rainfall beginning early in July, the same close connection between moisture supply and the planting of crops may be secured in various ways. Beans and sorghums, for instance, may be planted in the dust, too dry to germinate the seed. If then the rains are timely and sufficient the seed will germinate and grow on to maturity. Also the seed may be planted before the rainy season begins, in furrows previously wet by a quick run of water from a pumping plant. Springing from the wet soil, seed thus planted makes a start which, as in the case of the Moqui Indian's corn, enables the crop to take maximum advantage of the rainfall and push on to early maturity.

Of the utmost importance to the dry-farmer is the choice of suitable crops for the region in which he toils. In Arizona we have given particular attention to the native squashes, corn and beans grown by agricultural Indians of that region. The Papagos in particular have contributed a species of bean, of which some 50 varieties have been isolated, commonly known as tepary beans. These beans germinate with wonderful rapidity, thus taking quick advantage of favorable rainfall. They blossom long before ordinary varieties, and with a favorable supply of moisture reach an exceptionally early maturity. Should a period of drought intervene the plants cease growing and drop most of their leaves, thus economizing transpiration water losses. The green stems and the growing points are thus enabled to endure until the belated rains come, when the plant again springs into growth, develops new leaves and another crop of blossoms, and at last makes its crop. Quick-growing, drought-resistant varieties of native corn have also been obtained from these Indians, including a sweet corn at first mixed with field corn, but finally bred out pure, which gives us at last a variety of sweet corn which produces well in our arid sub-tropical climate.

Importations from other arid regions of the world are proving well adapted to our own so-called desert country. The sorghums in general, particularly dwarf varieties that grow with minimum water supply, are among the best of these importations. Feterita and dwarf milo maize, originally from the Sudan, are probably the best of these, on account of

the shortness of their growing season, their drought resistance, and their abundant yield of nutritious grain. Sudan grass, also, a recent importation by the United States Department of Agriculture from North Africa, is proving wonderfully well adapted to Southwestern cultural conditions. Native Indian beans and corn, grain sorghums and Sudan grass from North Africa, probably are the most valuable crops thus far available to the extreme Southwestern dry-farmer at this time.

Yet another dry-farming resource particularly adapted to extreme conditions is the pit silo which, migrating westward from the plains region, has proved particularly well adapted to arid localities; for equally important with the successful production of a crop of corn forage, of sorghums, or of Sudan grass, is the question of its most profitable utilization. As dry forage the value of these crops is relatively low; as ensilage it is maximum, and moreover may be kept in this state for use at times of drought or of frost, when other sources of supply must fail.

A fourth step in the successful solution of the dry-farmer's problems is the choice of farm animals best adapted to make use of the crops grown. The dry-farm, through the medium of the silo, thus comes into close connection with sheep and cattle from the range, making possible the advantageous feeding of stock at times when the ranges fail. Dairying likewise is developing with the help of the silo, which affords the indispensable supply of succulent feed required by this industry. Hogs also are an important resource for the dry-farmer in this region, inasmuch as the grain sorghums, together with succulent silage, afford a cheap and most effective ration with which to mature an always readily saleable product. Yet again, poultry affords an important means of using the products of the dry-farm. Sorghum grains in particular are well adapted to poultry and the dry and roomy locations available on the ordinary dry-farm, are especially well adapted to turkeys, which originally ran wild in great numbers through this country and which are thoroughly at home in this general region.

Of utmost importance to the dry-farmer is a full realization of the supplemental use of the various resources available to him, no one of which is adequate by itself to a successful solution of his problem of making a living from the land. To explain my meaning—the stockman relying upon the grazing range alone is subject to disaster by drought; the dry-farmer relying upon rainfall alone will likewise often fail through want of a timely and adequate water supply; the pump irrigator alone will fail because he cannot afford the cost of his pumped water supply. But upon the combined resources of the grazing range, the dry-farmer, and the irrigator, a scheme of agriculture can be built up that combines all of their advantages and avoids the disaster almost certainly resulting from dependence upon any one of these alone. The grazing range, for instance, with its rich burden of green feed during the rainy season, thus supplements the dry-farmer's silo; and the water supplied by the pump irrigator at times when water must be had to start or save a crop, supplements the rainfall upon which the dry-farmer may mainly rely. This co-operation between cheap range feed, timely dry-farm forage supply available as silage, and pumped or stored water supplies used in time of need, together with a scheme of livestock

adapted to the particular situations of the dry-farmer, points the way towards the utilization of hundreds of thousands of acres of lands in a region of which it was formerly said that it could only be farmed by means of a copious irrigating water supply. At altitudes of 4,000 feet and below the problem is more severe. At altitudes of 4,000 to 7,000 feet, where conditions are more mild, the problem is more easy of solution; but the developments of the last ten years indicate clearly a considerable future for an agriculture in this region founded mainly upon the ideas mentioned above—the most effective possible use of rainfall; quick-growing, drought-resistant crops; silos; livestock; and the skillful supplementary use of grazing range, dry-farming, and irrigating resources available within the region.

Undeveloped Possibilities of the Range.

But in considering our subject, "The Future of the Range," we are privileged to go beyond present accomplishments and to give some rein to the imagination in looking to a still more distant and unrealized future for the region. It is said that Powell, in his vision spoke of our desert plains and their possible uses to mankind. We have endeavored, in the space allotted us in the dry land section of this Exposition, to call attention to some possibilities of desert vegetation. I have here, for instance, in my pocket a bit of rubber dug up from ancient Indian ruins, probably from one to three thousand years old. This little bit of rubber is undoubtedly derived from the guayule shrub, a plant of the aster tribe, which has recently been utilized for its rubber content. This ball of rubber, which must have been chewed out of the bark of the shrub by some prehistoric Indian and the quids squeezed together into a ball which he used for his games, and which is probably the oldest piece of rubber in civilized possession today, is the forerunner of what possibly may develop into a great industry founded upon this desert shrub, specimens of which you will find in the exhibit. In civilized hands it may be found possible to cultivate it to advantage. The teeth that chewed out this prehistoric sample will be replaced by ponderous mills adapted to the extraction of rubber from the shrub, and the product will be devoted to the manifold uses which have been devised for rubber within the last 70 years. This shrub is distinctively a desert plant, dependent upon arid conditions for a maximum production of its peculiar constituent, growing freely with a good water supply but almost indestructible by drought, and producing a crop which, if successful, will be of enormous value.

You will find also in our exhibit a little group of fibers prepared from desert plants resistant to drought and to heat and to frost, and which seem naturally the result of the strenuous conditions under which they were produced. Is it not possible that cheap desert lands, with scant and uncertain water supply, may sometime be found available for the production of fibers, for which there is an almost unlimited demand in modern industry?

Then, too, you will find specimens of cacti in the exhibit, suggesting the uses to which these plants may be put. In one case the spines have been singed off of the sample to show that famishing cattle may make

use of the succulent plant. How completely the water supply required by range animals in a desert country may be afforded by these cacti is proved by a district in western Sonora where for two or three months during the dry season each year cattle live without water, deriving their whole moisture supply from the succulent joints of certain cacti. Under these conditions cows even afford milk to their calves, and to their owners for the manufacture of cheese. These desert cacti may easily be called living silos, storing within their skins a supply of succulent material of supplementary value to the browse of the range. On another joint of cactus you will find a quantity of cochineal insects, suggesting possibilities of use of these plants as cultural ground for materials of this character.

There are yet other possibilities in desert plants in the form of chemical compounds valuable as medicines, as varnishes, and as tanning materials. The tanin of the canaigre and the varnish contained abundantly in various desert plants are examples of these possibilities.

Yet again, there are desert animals peculiarly well adapted to open arid ranges. Why should not ostriches some day become a range animal in the otherwise unreclaimable portions of this desert country, just as they now are in certain portions of South Africa; and with the help of moisture supply derived from cacti indigenous to the region, may not a limited use be made of these ranges through the medium of other desert animals that may be introduced? Who can say? The possibilities as yet only suspected, with the help of modern ingenuity and modern demands for products which are favored by our extraordinary conditions, are now beyond exact imagination; just as one hundred years ago human wisdom could not have foretold the uses or the future now attached to this little fragment of rubber of which I have told you.

The Range as a Playground.

Finally, after all other possible uses of the range—by the cattleman, by the dry-farmer, by the artesian irrigator, by those who shall make unexpected uses of the desert plants, have been exhausted, let us hope that the last one hundred million acres, more or less, of our Western country may forever remain unoccupied and free as a playground for humankind—a land where possibilities of adventure may yet remain, a riddle which may tempt the courage and ingenuity of men, a place of recreation where

“Finding food for heart and soul
In shimmering plains and marching storms
In gleaming rocks and frowning mountains”

humankind may drop its load of care, forget its anxieties and gather freshness and strength with which to return to the intricate contest which modern civilization imposes upon all of its subjects.

Where, indeed, shall we find a land that so combines the opportunity for ingenious effort in all the departments of agriculture and the opportunity for uplift and recreation afforded by the great expanses which will always remain as undeveloped country? With such oppor-

tunities and in such surroundings it is inevitable that the people occupying this country in time to come will develop unusual qualities of mind and character.

PRESIDENT JARDINE:

The next number on our program is Director Youngblood of the Texas Agricultural Experiment Station. He is going to talk about livestock on the farm. We have had altogether too little said in these sessions about livestock in connection with grain farming. I am glad we have a speaker today who is interested in the development of livestock and one who is doing all in his power to boost this industry for Texas. Texas is fortunate in having Director Youngblood in charge of its agricultural investigations and because he is vitally interested in livestock.

Live Stock and its Importance on the Farm

DIRECTOR YOUNGBLOOD:

The farmer should be a business man, and farming should be considered a business enterprise and not merely a means of subsistence. The farm should be developed and directed so as to yield a fair reward for one's skill and executive ability. Efficiency should be the first thought. The farm should not merely be made to produce such products as are profitable or desirable, but it should be made to produce them in such a manner that they may be produced at less expense and in greater abundance another year.



We find examples in abundance of early-day farming which promised success and brought failure in the end. Grain and cotton farming are notable examples. Both types impoverish the soil. In grain farming a drouth during the period in which the grain matures brings disaster, for it is not forage but saleable grain upon which the farmer depends for his money. The cotton farmer faces a similar situation. He must not only produce stalks, but bolls of cotton, as it is the seed and lint upon which he depends for a living. There would be no economic objection to the outright sale of crops if crops were "just crops," but crops are not "just crops." They are crops plus an appreciable amount of the original plant food elements in the soil. In hauling these elements off and selling them, one is not only selling the products of his labor, but also he is selling an intrinsic part of his farm which he has no right to sell, namely, the producing power of the soil.

Profitable farming is clearly dependent upon provision for the maintenance of a high state of soil fertility and the cheapness of the method

whereby this is accomplished. In many sections of the country, when it was found that the soils had become unproductive through continuous cropping, an effort was made to continue the same crops by the application of commercial fertilizers. This was but temporary relief, and did not solve the problem. The cheapest source of plant food is live stock. The manure of livestock not only contains plant food, but organic matter which should, as a rule, be applied along with commercial fertilizers. Many soils, as the black lands of Texas, fail to respond to applications of commercial fertilizers, but do respond very satisfactorily to applications of barnyard manure. The most practical means of stopping the selling of soil fertility through crops, is to grow or buy livestock, feed or finish it on the farm, and return the manure to the soil.

The foregoing is suggestive of the fundamental importance of a specially arranged cropping system for the farm. Without this, neither manure nor commercial fertilizers can be made to produce best results. If, in accordance with the modern order of things, it is wise to sell a given crop, as for instance cotton or wheat, then a sufficient number of animals should be kept and finished to supply manure to the soil, equivalent in fertilizing value to the plant food taken out of the soil by the crop sold. Many of us are inclined to condemn the man who buys feeding stuffs, but, the standpoint of permanency considered, the wise farmer keeps sufficient livestock that he will be compelled to buy feeding stuffs, rather than have a surplus for sale. Again, we no longer think of feeding cotton seed on the farm, for in doing so we would be wasting a crop of oil worth from \$5.00 to \$7.50 per acre, figuring that the yield of cotton will vary from one-third to one-half bale to the acre. A ton of cotton seed will yield 40 gallons of oil, worth 75 cents a gallon, at the present time. Instead of feeding the cotton seed on the farm, we sell it to the oil mills and buy back the cotton seed meal. For a similar reason wheat is sold and the bran bought back for feed. Even under a system of stock farming it may be necessary to buy some commercial fertilizers, particularly phosphoric acid, but the point is this expense will be reduced to a minimum under a proper system of stock farming, whereas much of the so-called profits of crop farming is dissipated in having to buy back the plant food sold in the crop, at a higher price. By livestock farming, for the purposes of this paper, we mean farming wherein livestock is maintained in sufficient number to supply the farm with manure. It may include farms whereupon certain money crops, which fit well into the rotations, are grown.

While the matter of maintaining soil fertility is a primary reason for including livestock in our farming operations there are other reasons also worthy of consideration. We not only get plant food cheaper, but under present conditions we actually get a better price for the crops fed than would be the case if the same crops were sold. Otherwise it would not be profitable to feed cows and sell milk, to feed steers and sell beef, to feed lambs and sell mutton, to feed chickens and sell eggs, and so forth. When this is not the case, there is something wrong with the market for animals and animal products. On a well ordered stock farm, where necessarily a number of crops are grown, we find not only a better balanced ration for the plants and the livestock, but for the family as well.

The matter of properly feeding people is really of more importance than that of feeding the plants or the livestock. Not only is the meal which may be produced at home on the stock farm better balanced, but it is more palatable and generally more healthful. Certainly we may expect people so nourished to be hardier and better capable of performing their various duties of life than those who are improperly nourished for lack of a proper ration.

Then again is the matter of association with livestock. Any boy reared away from livestock has missed a fundamental part of his general education. Every boy and girl are naturally admirers of livestock, and should learn their habits and their needs by growing up with them. Livestock farming, therefore, is not only the key to the problem of a permanent agriculture, but is the type of farming which is most conducive to health and happiness in the country.

The question may be asked, "How about the farmer who insists upon growing crops, instead of livestock, for a living?" The answer is, those men—truck farmers, fruit growers, and so forth—who find it profitable to grow crops alone, have access to a cheap source of manure or other plant food which really should have been kept on the other fellow's farm, or which would otherwise go to waste in and around the cities. Another type of crop farmer is the man who grows feeding stuffs, but is unable, for the time being, to keep livestock. On the other hand, there is the ranchman who produces feeders in range country, where crop production is not possible.

It is the duty of this and every other organization for the advancement of agriculture, to bring the farmer and the ranchman who produces feeders, together. The farmer should be taught to buy feeder steers, hogs or sheep, and finish them on his place. This practice will build up soils just as surely as if the feeder stock were produced instead of bought. Farmer-feeders are not uncommon in the Corn Belt, and are thrifty. But we have very few of them in the South, and not enough of them in the semi-arid country, possibly because feeding has been possible in the semi-arid region only for the past few years, or since kafir, milo, feterita, sorghum, and Sundan grass were introduced by the Government.

In the South, especially, an immense waste of plant food has resulted from commercial feeding around the oil mills and the packing houses. The margin of profits in finishing livestock has become so narrow that it is no longer an absolutely safe business for the commercial feeder. It is a much safer enterprise for the small farmer who usually has a lot of stubble which makes good grazing and lessens the cost of finishing. He can feed on his fields and thus secure the benefits of all the manure, both liquid and solid, derived from the feeders. Objection may be made that finishing is a business unto itself, and that it is dangerous for the farmer to engage in a business in which he has had no experience. These things may be very true, but it must be remembered that the farmers throughout the country are now doing many things very successfully which only a few years ago they were unable to accomplish. This change in the ability of the farmer has been brought about largely through the aid of the state agricultural experiment

stations and the demonstration agents. If the farmer is entitled to this guidance in the matter of crop production, he is equally as much entitled to similar guidance in the matter of livestock production. In many places the demonstration agent is already rendering this service in a most satisfactory manner, and all that is left to be done is for the State and Federal agencies to extend the work to every section. The crop farmer is busiest during the spring and summer months. During the late fall and winter months he and his equipment are usually out of productive employment. The finishing of livestock during these months would fill in the void, and make his farm a more profitable and a more interesting proposition.

Livestock is especially efficient in converting materials which would ordinarily go to waste into valuable products. Poultry, for instance, converts grasses, insects and wasted grain into eggs and meat. Sheep convert grass and weeds into mutton and wool, and at the same time make better pastures for other livestock. Angora goats on the farm are most efficient animals. They convert brush and weeds into mohair and meat, and if enough of them are kept to the acre they will clear the land and kill the stumps. The dairy cow is especially efficient as a manufacturer of human food, and there is room for her on every farm and ranch in the country.

Not only is stock farming best for the farm and for the farmer and his family, but it is favored by American conditions and ideals. Our climatic conditions are such that the ultra-intensive farming of the Orient is hardly possible, and our ideals are such that we prefer a less intensive population and a high standard of living to an intensive population with its low standard of living.

The human being is naturally omniverous, and will continue to eat meat with his bread as long as he can. No one substitutes beans for meat except in cases of necessity. Any man able to do so is going to pay the price for milk and butter, poultry and eggs, fresh and cured meats, and such is the prosperity of this country that, the proper relation of things maintaining, no man will go very long without them. As long as this is the case, stock farming will continue to be not one of the most popular, but one of the most profitable types of farming which a man can follow.

President Jardine called upon Mr. H. M. Bainer to preside over the remainder of the session.

MR. BAINER:

I am sure we all appreciate this talk of Director Youngblood of the Texas Experiment Station. If we follow his teachings we are bound to be successful in the Southwest.

I wish to ask the Secretary if there are any announcements to be made at this time.

SECRETARY WELCH:

I want to hear from the delegates from each state the names of

their representative on the Committees on Nominations and Resolutions. We would like to have those appointments made as early as possible today so the two committees can get together after the session this afternoon.

MR. BAINER:

It is very important that each state have its representative appointed.

The next number on our program for this morning will be given by a man who has been on our program at different times in connection with the Farm Congress meetings and one from whom we are always glad to hear,—Colonel A. J. Bester. Colonel Bester, as you know, is the representative from South Africa, and is at this time doing some work in the United States in the Panhandle of Texas. Colonel Bester is to talk to us this morning on the subject of "Livestock and Agriculture," and his talk is applicable to all the Southwest.

MR. BESTER:

Mr. Chairman, Ladies and Gentlemen:

I come from a country where we are all farmers—South Africa. That is a country where we are trying always to get as much out of our work as possible. Our occupation is mainly agriculture and stock raising, but we never lose sight of the fact that we must keep building up our soil. We cannot do that without making feed for our stock. If you have high-bred stock on the farm, you have good feed for them, and if you have good feed, you must have shelter.



I came to this country in 1912, sent here by the Farmers' Congress of South Africa, composed of the farmers themselves and the objection always was, we are not getting enough out of our soil. So the Farmers' Congress appointed me to travel over the world and find out where we could have machines made strong enough to plow deep enough and to stand up to our hard work. Our country is a sun-baked country. The ground gets hard and you have to plow deep. I find the same is true in this country.

After I have gone all over this country and have seen farming under irrigation and under dry-farming methods, I have come to the conclusion that South Africa is away ahead in stock breeding and in the tillage of the soil. I had travelled all over this country and when the war broke out, I was ready to go back, but I knew there was going to be trouble, so I decided to stay here.

I looked for a place to try out one of my big machines. I asked the Government of the United States where the hardest soil in America was and they said in the Panhandle of Texas. I looked the proposition over and I thought the Panhandle of Texas was as good a part of the world as I had seen anywhere. I thought the people in this country

did not know much about the tillage of the soil, and I decided I might as well stick that big plow in the soil and show them how, so I got 6,400 acres of land. I have plowed, with only one man, 480 acres of land. Now there are two men on the farm—myself and one other. I have planted 400 Norway spruce trees, but they are too slow to bother with, so I wrote to South Africa, and secured seeds of nine different kinds of hardy Eucalyptus trees. I planted these from seed on the first of April and they are now from three to four feet high and this winter will prove that they will stand the cold.

When I started plowing, some of the farmers there said it would blow away, but I did not pay any attention to it because I knew they did not know what they were talking about. The result is I started plowing on the first of last December and I plowed on through the winter, with only one man. From the first of January to the first of June we got two inches of rainfall, but my deep tilled land was in good shape. I also knew if you are going to till your land deep, that land should lay fallow for 12 months, so I left it fallow that long. Then I planted some spring wheat. The ground was in such fine shape I could not keep my hands off it. Afterward, my wheat came up and grew and held its own on the deep-tilled land without a drop of rain after the 15th of January. Then the farmers wanted to know why I didn't cut it and said I could get three bushels to the acre, but I told them that in my country we did not bother with a crop of three bushels to the acre.

What I want to tell you people is that we have to have money to sink into the ground and we have to have time for development. If we are ever to develop this country, we ought to have money to go ahead and work. Taking the Panhandle of Texas, I never knew a better soil than they have there. I never saw anything like it. Just think of a soil from 15 to 50 feet deep without having any sour soil at all.

The farmers on the Panhandle of Texas have valuable stock. At Amarillo I saw some of the most beautiful Hereford stock grown anywhere and when you look at the stock there, I do not know of any better farming proposition in any part of the world. When that land is properly developed, it will be the most valuable land in the world. However, we have to lay down a system of farming in that country and my principle is to plow deep, as deep as possible, from 12 to 18 inches. We have to plant trees—we have to find the right trees to plant to stop the wind. The wind is doing more harm today than anything else—blowing the humus out of the soil. If the country is planted in Eucalyptus trees, in three years' time there will be a great protection for the stock and the soil. The greatest gold fields in the world in South Africa would not have been worth five cents had it not been for the eucalyptus trees to timber the mines and stop the wind. Today, as you look over the plains of South Africa, you find millions and millions of eucalyptus trees that are supplying the timbers for the largest gold mines in the world. If we plant trees like that in the Panhandle of Texas, it is going to be the greatest agricultural country in the world. Talk about fertilizer, you can grow a root system in Texas of two and three feet deep that will fertilize the soil all the time. We must bury the humus so the wind will not blow it away.

I have 400 acres in wheat, 200 acres in winter and 200 in spring wheat, but I claim that spring wheat beats winter wheat any day. You do not want a crop that stands six or eight months on the land when you can have one in three or four months.

If we in South Africa had a country like the Panhandle of Texas, you would not be able to buy an inch of that land, and the farmer would say "No, this is my bank. I am getting all my money out of it." But here we are running around all the time trying to get rid of the land.

MR. BAINER:

I am sure we are all very much interested in this talk of Colonel Bester's and to hear of the successful results he is obtaining in the Panhandle.

If there are no announcements, we will consider ourselves adjourned until 2 o'clock this afternoon.

Afternoon Session

October 20, 1916.

MR. BAINER:

The Congress will be in order.

SECRETARY WELCH:

We are waiting for a number of appointments on committees and so far we have only one or two. I would like to ask if there are any now who want to turn in names for membership. If not the President will appoint representatives from the different states on these committees, so they can get together and make their report tomorrow morning.

PRESIDENT JARDINE:

Through the courtesy of the Mexican Government, we are going to be favored with a number of selections by the Mexican National Band. We are making history now for the International Dry-Farming Congress. This is the first time in its life we have been thus honored and this will go down as one of the landmarks, I am sure, in the annals of this Congress. We deeply appreciate the courtesy that has been extended to the Congress on behalf of the Mexican Government. They will play a number of selections, after which we will proceed with the regular program as scheduled.

(Several selections were then given by the Mexican National Band after which the regular program was resumed.)

PRESIDENT JARDINE:

I am sure we all feel very grateful to the Mexican authorities for the courtesy afforded us this afternoon.

We will now proceed with our regular program.

The International Dry-Farming Congress is truly international in scope as well as in name. We have always had present representatives from a number of other nations. This year, the representation from other nations is less than it was last year for reasons with which we are all familiar. We do, however, have a number present and it is our pleasure to listen to a number of representatives from other nations. The first speaker of the afternoon is the Honorable Niel Nielsen, who has been closely identified with the work of this institution. He has taken more than a passing interest in the organization. He has been an active worker and we regard him as one of us and we are very glad

he is able to be here today and speak to us. I take pleasure in introducing to the assemblage the Honorable Niel Nielsen of Australia.

Agricultural Development of Dry Lands

NIEL NIELSEN:

The world's population depends upon the production of food and clothing. Every increase in population demands a relative increase in production. The number of people that any country can support in reasonable comfort is governed by its production and this production is governed not only by the natural fertility of the country concerned, but by the intelligence displayed in the organization and utilization of its producing elements.

The difference between the civilized and savage man is not so much the fact that the civilized man has additional brain power, but it lies in the application of this superior intelligence to the systematization of production and distribution.

Civilization consists of a system of community organization based upon the principle of making better provision for man's needs and comforts. It has resulted in increasing the population of the world enormously by reducing to a minimum the struggle for existence and this has been primarily accomplished by assisting and organizing nature's forces so that the production of the commodities essential to life shall continually outstrip the increases in population.

This is a never-ending problem which every generation must not only face but solve. Up to a certain period this problem was solved by emigration from the over-populous countries, and occupation of new countries, but the number of new countries which are available for occupation by emigrants from the older ones is rapidly being reduced. The time is coming and coming soon when we will be able no longer to send our surplus population to new countries but will have to turn to the other alternative of making better use of those we occupy.

This means we will have to increase production in an equal or greater ratio than our population increases, in fact we must make better uses of our natural resources than we have done in the past.

The natural resources of any country are contained within its lands and its waters.

We have already occupied and brought into production the greater portion of our high rainfall areas and therefore our future hopes of success must lie in the better utilization of the drier lands.

The term "Dry Lands" is purely a relative one. No consideration of the actual annual precipitation can of itself define which areas should properly be classed as dry lands or which otherwise.

Much less depends upon the amount of water actually falling upon any particular portion of the earth's surface than on a combination of all other collateral considerations.

For instance, a large rainfall in a country where the evaporation is correspondingly great is of considerably less value to plant life than a much lower rainfall in a section that is unswept by drying winds.

The configuration of the country, the character of the soil, the natural drainage both on and below the surface, the seasons during which the rains fall, the average character and intensity of the rainy weather, and a dozen other considerations come into play in determining the value of any area for the growth of economic plants.

However, the most apparent facts in classifying country as humid or dry will always be the amounts of rainfall and evaporation, but the man who uses the land to win his bread therefrom should, and generally does, give due weight to all the other considerations indicated.

Many of those who study the subject of the possible reclamation of the drier portions of the earth's surface, take an altogether too pessimistic view of the matter. They carefully tabulate the areas that have varying amounts of rainfall and in most cases classify as "dry lands" all those where fewer than a certain number of inches of rain per annum actually falls, and then enlarge upon the great proportion of arid and semi-arid lands that exists in almost every country.

Taking the land surfaces of the world, the proportion whereon the annual rainfall is fewer than twenty inches is according to the best authorities' about 55%. Of the continents, Asia contains the largest proportion of dry lands, South America the smallest.

In the United States 51% of the total area has an annual rainfall of over 20 inches and 49%, under 20 inches; of the latter 18% has under 10 inches.

In Australia only 31% of the total area has an annual rainfall of over 20 inches while 69% has under 20 inches, and of the latter 32% has under 10 inches.

These figures, as I have previously stated, only give a very rough idea of the actual aridity of the countries concerned, but are sufficient to show that on a great proportion, probably amounting to two-thirds of the earth's surface, the production may be enormously increased by the adoption of scientific dry-farming methods and that on more than half of this area dry-farming or irrigation is absolutely essential to insure sufficient production to support anything like a reasonably dense population.

What tremendous scope this opens up for the application of our intelligence to increase production. The magnitude of the work is so great that it would be appalling were it not for the fact that there is room for countless millions of workers each doing his share towards the common end and each having within his power to produce results of a magnitude commensurate with his energy and application.

It has been said that the greatest work that man can accomplish on this earth is "to make two blades of grass grow where one grew before." Every one of us can help to do this by helping to spread to the four corners of this earth the knowledge of what can be done by the scientific agricultural development of the world's dry lands.

It has been computed that if all the available fresh water on the earth that otherwise runs away into the sea could be conserved, it would be sufficient to irrigate about 8% of the dry country which requires additional water to bring it up to its full producing capacity. This shows what enormously beneficial results could be brought about by a systematic conservation of water for irrigation purposes, but how much greater a work is it to provide for the people concerned, the scientific knowledge of how by dry-farming methods the greater part of the remaining 92% of these dry lands can be successfully and profitably occupied.

That is the work that the Dry-Farming Congress sets itself to do. Let me say that I know of no nobler missionary work that can possibly be accomplished than to endeavor to carry to the people in dry countries the art of dry-farming.

The possibilities of irrigation are considerable, but the possibilities of dry-farming are immeasurably greater.

The one system brings the water to the thirsty soil, the other conserves within the soil itself as much as is possible of the natural annual precipitation. There is no conflict between the two systems; on the contrary they are so closely related the one to the other that they should be worked in conjunction. The dry lands of the country should be divided into those that can be brought within the scope of irrigation and those that must depend upon dry-farming, and these two forms of scientific agriculture practiced side by side, the one largely dependent upon the other. This could be brought about by

1. A comprehensive survey of the river systems of the country.
2. The construction of the necessary water conservation works to prevent floods and to provide for irrigation.
3. The selection of the lands within the scope of these available waters that were the best situated and suited for irrigation.
4. The classification of the remainder of the lands into lands which were suitable for dry-farming and those which were not.
5. The utilization of the lands unsuitable for dry-farming or irrigation for pastoral or other purposes and the others for dry-farming or irrigation according to their situation and capacity for either of these forms of scientific agriculture.
6. The provision of adequate means of intercommunication between the dry-farming and irrigable lands.

A system of this description or any modification of it to suit the local conditions of the country concerned would have the effect of first, organizing the nation's primary resources, second, putting those resources to their best uses, thus securing the greatest possible production from the lands of the country.

The governing idea should be the application of business principles to the affairs of the Nation.

The most important matter of national concern is the question of increasing production as rapidly as or more rapidly than population increases. This can only be done by a better organization of the nation's resources than has hitherto existed, and the time to start is now.

In most countries where the people have a share in the Government it has been laid down time after time in constitutions and in laws that equal opportunities should be given to each of the population and each individual thereof.

Let this principle be translated from the constitution to the land so that it may become a true reality.

PRESIDENT JARDINE:

When any institution that has for its object the accomplishment of some worthy and instructive work, has behind it such men as Mr. Nielsen, you may easily see in which direction it is headed. There are a great many things we in America can learn from Australia and the people of Australia. Australia a few years ago undertook to develop irrigation projects and they took from our country one of our men to help them. They found they had large tracts of land on which they had no settlement after they had the water and they found it was because they did not have funds to run these irrigation farms. So the people of Australia set about to find a way of carrying out this end of the proposition, and they are succeeding splendidly.

We have lying bare in this country seven or eight million acres of land, because our young men who want to farm do not have the money with which to pay the first price on this land. We need something like this system in our country. In Kansas we have 75,000 young men who want to farm, but who are without money. They are boys who know how to work, but they are going into the cities and into the Government service, because they do not have the money with which to gain a foothold on the land. And we are wondering why we cannot build up our schools—our rural ones. No tenant farmer is going to be interested in building up schools when he knows he cannot be on the farm for more than two or three years. He is not going to be interested in maintaining the soil fertility of that farm or in building it up. And so we must work out some system of helping these young men to get a start on the farms.

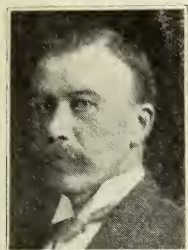
We have another representative here of a very honored and beloved nation—the nation of France. It gives me very great pleasure to introduce to this audience, Mr. J. M. Romagny, who represents his government at El Paso.

MR. ROMAGNY:

Mr. President, Ladies and Gentlemen:

In accepting the honor of the invitation to appear before you this

afternoon, I was painfully conscious of my inability to contribute anything to the special objects of your organization and your Congress. I



did respond, however, principally through my desire to bring to you the greetings of my nation. If it should ever come to pass that your country had been sentenced to death and she could only be saved by the destruction of that enemy's power, then and then only could you realize the feelings of our people and then only could you realize how difficult it is for them to turn their thoughts to any consideration other than the terrible one they have in hand. Nevertheless France does think of other things, as indeed she must, and never doubting her future for a moment. So she looks upon the present

trial as just one more after the many through which she has passed, not doubting that it is not likely to be the last. Ever and ever, now as before, she keeps going on with all the strength she can spare from the terrible struggle, with her domestic industries, her commerce, her science, and perhaps most solicitously of all, the tilling of her fields, right up to the very front of the guns on the firing line, and the plows, guided by the women, old men and children, are turned aside out of respect for the graves where friends and foes alike are sleeping. Her very soil seems to be participating in the nation's struggle, and thank God, yielding plenty of food so that the sons of the country may live.

As a result of this, the Department of Agriculture has been able to announce that the crops this year are about equal to normal—that is, however, with exceptions, as there are certain branches of culture in France that have become so specialized that extemporaneous means cannot be adequately substituted for the old ones. In addition to that loss and what really may be the full measure of the actual loss to the country in agricultural products, there appears to be nothing, so far as this year is concerned, but what she loses of the products of that portion of her territory that is still occupied by the enemy, a matter of about 1-27th of her total area. It goes without saying, of course, that this is referring to French territory in Europe alone, and not counting French possessions elsewhere. Shortly after the war broke out, she organized and very successfully held a great colonial exposition at Casa Blanca, and she is today pushing forward the construction of several hundred miles of railroad in that same country of Morocco.

Nowhere has France withheld her hand from the works of peace, and I am proud and glad to have been given the opportunity of presenting you this afternoon with the hearty assurance of her sympathy with the objects of these sessions. She has never been indifferent to these matters, but has always had a major interest in them, because she has to reclaim thousands of acres of arid lands.

She hopes you will not overlook the hand she holds out to you in peaceful co-operation and friendship. She needs your sympathy, but we are not begging for it. She holds out that hand now as once she held it out with a sword in it to help you win your independence. She also is friendly and has always looked to you in a friendly spirit. Of course, she also has need of some of your products as you may have need of

some of hers. Both countries can profit by the exchange. That no nation is sufficient to itself has become a commonplace that is not worth repeating today. The time has come when the nations must recognize the fact that they have need of each other,—that the welfare of any country cannot be confused with national selfishness. Some things you can do better than others, some things others can do better than you. It is by the free exchange or fair trading in these things and more particularly by the generous exchange of the best thoughts of the best men among all that civilization advances and extends to all lands without ever being mixed with possession or domination of any one of them over any other. Such Expositions as this here and such Congresses as this are probably the best means of bringing this about and as a citizen of El Paso, I am glad the city has been considered worthy of receiving these institutions this year.

Not long ago Lyons held a sample fair to which she invited the nations of the world to send samples of all their products. So well was that invitation responded to that several applicants failed to find accommodations for their exhibits. Nearly all nations were represented there, with the exception of those with which France is at war. Right there on that fair ground representatives of many countries met together and bought of each other, engaging in large transactions in products of their own lands. Perhaps there is in this an example for some great community in this country. Some such point might be selected that would be accepted as a permanent center for such gatherings. It is not so much the means of production that need improving as those of better distribution, for we all have felt the almost tragic absurdity of the existence of so much want on one hand and so much waste on the other.

I thank you.

PRESIDENT JARDINE:

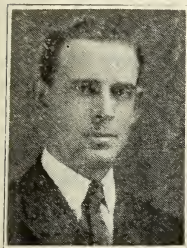
While France is engaged in this terrible struggle and while she is losing a great deal of substance, she is also building for herself a reputation that few nations have ever enjoyed before. We are very glad to have a representative of the Government here to speak to us along the lines he chose.

The next speaker on the program will be A. H. Leidigh, Professor of Agronomy at the Texas Agricultural College. His subject is "Cotton As a Dry Land Crop for the Southwest." Mr. Leidigh is engaged in experimental work over the state and is familiar with every section of the state as well as the entire Southwest.

Cotton as a Dry Land Crop

MR. LEIDIGH:

Cotton is the most important fiber plant of the world. It is widely adapted and is distributed throughout practically all warm climates as a cultivated crop.



Because of the wide range of cotton culture it is interesting to note that this crop, while most important where there is a heavy annual rainfall in the United States, is at once very important as an irrigated crop and as a non-irrigated crop in dry regions.

That there may be a vast increase of the cotton area in the irrigated sections of the Southwest is well known to many. My subject today, however, is of cotton as a dry land crop.

In the brief space of this paper I must not bore you with statistics and abstract data. I wish, however, to tell you just how important this crop has become as a Western crop.

Texas produces about 30% of the United States' crop. Georgia, Alabama, Mississippi, produce about 10% to 15% each. Tennessee, the Carolinas, Louisiana, Oklahoma, Arkansas, Florida, Missouri, Virginia, Arizona and California contribute the balance.

Now, of the 30% of the United States' crop which Texas produces just about one-half is produced in dry-farming territory. This is 15% of the United States' crop, or 10% of the world's crop.

This vast production of cotton in one corner of the Southwest is going to increase greatly and assume even greater importance. Let us examine this subject by the following method:

First:—The dry-farming region of Texas.

Second:—The part of this dry-farming area adapted to cotton culture.

Third:—The future development of the production of the crop in this Texas dry-farming region.

The climatic features of the Texas dry-farming region are only different from those of the other plains states in that there is little winter and a much longer warm period in summer. As a consequence of the lack of cold a given amount of rainfall is of less value than it would be in more northern regions. This area in Texas has, in fact, an annual precipitation larger than at first thought would seem to necessitate the use of dry-farming methods.

One of the ways of determining the boundary of an agricultural region is to base the divisions on the wild animal and plant life. Now, in Texas the humid life types do not occur west of the 33-inch rainfall line at the northern line of the state and the 40-inch rainfall line at the gulf coast. This line of separation between life types has a mean annual rainfall of 35 inches. This line, as it is extended northward crosses the region of 20 inches annual rainfall at about the Nebraska-South Dakota

boundary line. It is, in fact, throughout its whole length an ideal line for the eastern boundary of the dry-farming region.

From a crop producing and agricultural standpoint this above described line is satisfactory. The rainfall west of this line may occasionally fall as low as 7 inches a total for the summer, April to September, inclusive.

The western limit of dry-farming is not reached in Texas except in some dry and mountainous regions in one part of the state. The rainfall throughout the entire region is variable, there being liability to periods of drouth. It is interesting to note (See map figure) that the 20-inch annual rainfall region roughly coincides with a 15-inch summer rainfall, April to September, inclusive, and that this line is approximately the western limit of cotton as a dry farm crop. Even in the 15-inch summer rainfall district there may be as little rainfall for that period as a total of only 5 inches. As the northwestern and the western extension of this region have altitudes of 2,500 to 4,000 feet it is apparent that the shortness of seasons and the cold nights alone would render the production of cotton impossible there.

The part of the dry-farming region adapted to cotton culture reaches a western limit that is established by:

First:—A shortage of available moisture.

Second:—Altitude which causes a shortage of heat during the growing season.

Third:—Altitude which causes a short growing season.

By referring to the map presented here it will be observed that the extension of cotton to the northward in the southeastern states is governed largely by lack of heat. This same lack of suitable conditions seems in part to limit the crop in its westward extension. Here, however, a different factor is encountered, that of lack of moisture.

The extreme limits of cotton production are established by not less than a mean annual temperature of about 55 degrees, a mean monthly temperature for July of 77 degrees and 20 inches mean annual rainfall, or a mean total rainfall of 9 inches, April to August, inclusive.

The area of important cotton production has not less than a mean annual temperature of 59 degrees, a mean monthly temperature of 79 degrees and 22 inches mean annual rainfall, or a mean total rainfall of 10 inches, April to August, inclusive.

Now, as the above described temperature and rainfall regions approach and cross each other in western Texas it is apparent that this point is the northwestern limit of dry land cotton production. Furthermore, it is apparent that moisture requirements alone establish the boundary limit further southward with just as much definiteness as the temperatures do to the northeast. A concrete illustration of how definitely these factors, and especially that of moisture, limits the production of the crop is contained in data collected at Texas Experiment Station No. 8, Lubbock, Texas. These are as follows:

The temperature conditions indicate that this place is on the edge

of the cotton belt ranging from 75.3 degrees to 76.9 degrees for the years 1913, 1914 and 1915.

1913.

Inches winter rainfall -----	1.81
Inches summer rainfall -----	8.66

Total inches, except Sept. and Oct.-----	10.47
--	-------

The above gave 949 pounds of seed cotton per acre by careful dry-farming.

1914.

Inches winter rainfall -----	4.21
Inches summer rainfall -----	21.49

Total inches, except Sept. and Oct. -----	25.70
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The above gave 2,600 pounds of seed cotton per acre by careful dry-farming.

1915.

Inches winter rainfall -----	7.43
Inches summer rainfall -----	16.09

Total inches, except Sept. and Oct. -----	23.52
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The above gave 1,179 pounds of seed cotton per acre by careful dry-farming.

We find from these figures that the winter rainfall does not influence the crop much. In fact, if the excess rainfall of April 1915 over the other years were converted as winter rain then that year would read:

11.97
11.55

23.52
11.79

This gives the following parallel:

1913—10.47 inches summer rainfall— 949 pounds seed cotton.

1914—21.49 inches summer rainfall—2600 pounds seed cotton.

1915—11.55 inches summer rainfall—1179 pounds seed cotton.

As the temperature in 1915 was 1.3 degrees low, it seems that temperature aided in reducing the yield.

Now, as the summer rains may go as low as 5 inches throughout most of this entire area, it may be easily decided that the limit of production would be moisture. In fact at Lubbock it is moisture.

It should be evident, that the yields I have mentioned are very large. The farmer in that region has also obtained large yields. This is because the rainfall has been abundant. It can be less.

There is little more expansion in the dry-farming region suited to cotton, because already one and in places two limits are now reached. There is, however, plenty of room for internal development.

The production of cotton in the dry-farming area of Texas amounts

to about 15% of the United States' crop and 10% of the world crop. Cotton is not choice as to soils. It is a long-season crop and relatively resistant to unfavorable weather. The condition and yield of the crop is less subject to violent and wide fluctuations than most other crops. In fact, a "half crop" in the cotton belt is unknown. These features make it a crop suited to the region under consideration.

The farming methods employed in its production are just good, common-sense dry-farming. Early fall plowing or listing, furrow planting or listing, a thin regular stand, and sensible cultivation.

It appears that the greatest future increase in production will come from two sources: (1)—better yields. (2)—more acreage in the region.

Cotton is an adaptable crop. All experiments show that specific varieties must be developed for given conditions and that considerable care is needed to keep these up to standard. Now, in this entire dry-farming region most of the cotton seed is not improved in this region, nor is it received from any well recognized best producing region. It is a known fact that certain varieties and strains of cotton are giving better yields and are better suited to the economic situations in this region than many of the more easily purchased varieties. It is evident that along this line lies the approach to larger production, because the improvement of a crop within its proven area of adaptation is easily possible.

As to an increase in the acreage it need but be noted that while fully 75% of the land in this entire district may be farmed, only about 25% of it is farmed.

In conclusion then, it appears that the dry-farming district of Texas is bounded on the east by the line of 35 inches normal mean precipitation, which is about the same as that separating humid and non-humid plants and animal growth.

The western limit of dry-farming does not occur except in extreme western Texas, but the western limit of cotton production as a dry-land crop does occur. The western limit of dry land cotton is established by altitude, rainfall and temperature and is already reached.

There is a great increase possible in the production of dry land cotton. This increase will be possible by reason of better yielding varieties and because of more acreage.

PRESIDENT JARDINE:

We have not had much discussion from the floor. Mr. Leidigh has been rather definite in some of his statements. Do you all agree with him? Are there any questions?

A DELEGATE:

I conclude from your statement that about three times as much cotton can be raised there as is being raised now.

MR. LEIDIGH:

In this dry-farming proposition, 75 % of the land could be cultivated and only 25 % of it is, but of that cultivatable part, the greatest share of it is devoted to other crops than cotton and if we raised three times as much cotton as we raise now, the population to handle it would not be there. At a certain time of year, you have to have the people there to harvest that crop. We would not have the population in that area to handle it. It will not maintain that population but will maintain a general agricultural population. If we attempted to maintain the entire cultivatable area to cotton, then we would be like the people of India who, when they get unfavorable climatic conditions, starve. Cotton is a thing you have to sell. There is a little by-product, the seed, but if we do not make a crop, or if we get unfavorable climatic conditions, we have nothing at all.

PRESIDENT JARDINE:

Are there any further questions? Are there any announcements to make?

CHAIRMAN DRUMMOND:

Mr. President, we would like to have a meeting of the Executive Committee of the International Dry-Farming Congress.

PRESIDENT JARDINE:

What is the pleasure of the Congress? Shall we meet in the morning? We can get through with our papers in two more sessions. I would like to have as much of the afternoon session for open discussion as possible. Shall we have an evening session?

CHAIRMAN DRUMMOND:

Mr. President, do you think it would be necessary?

PRESIDENT JARDINE:

We have plenty of time if it is necessary to meet this evening. I think we can get through in the sessions tomorrow, however.

CHAIRMAN DRUMMOND:

I was going to suggest a plan that might dispose of the business tonight, but if we have a night session, it would interfere with that plan. I think the best place to call a meeting of the Executive Committee would be in the Chamber of Commerce Building in the Directors' room and the permanent offices of the Congress are in the same building. The meetings of the committees you have appointed, I mean the Committees on Resolutions and Nominations, could be held there tonight, if you desire, as well as the annual meeting of the Executive Committee, and we would get a larger attendance of the members of the

Executive Committee there than here. However, if you desire a night meeting, then the meeting of the Executive Committee should be held here.

MR. THROCKMORTON, of Kansas:

In view of the fact that all the papers can be given tomorrow, I move that we have no session tonight.

PRESIDENT JARDINE:

It has been moved and seconded that we meet in the morning at 9:30 instead of having an evening session. We want to meet here tonight if there are things that should be discussed here. Many of us have come a long distance, and if there are matters that should be threshed out tonight, let us be free to say so. Are there any questions?

All in favor of this motion, make it manifest by saying "Aye." All opposed, "No." The "Ayes" have it.

CHAIRMAN DRUMMOND:

I desire to announce the annual meeting of the Executive Committee in the Directors' room of the Chamber of Commerce Building at 8 o'clock, and I will suggest that, if you desire to call the meeting of your Committees on Nominations and Resolutions at the same hour and place, there will be ample accommodations for them.

PRESIDENT JARDINE:

I have not yet received those names. Do you have them, Mr. Secretary

SECRETARY WELCH:

We have a list here to read and these people will serve as a Committee on Nominations and a Committee on Resolutions:

Arizona, R. H. Forbes.

California, J. W. Gilmore.

Colorado, John Howell, T. C. Lippett.

Idaho, J. W. Turley.

Kansas, Bruce Wilson, R. I. Throckmorton.

Louisiana, F. W. Zerban.

Missouri, W. R. Rowe.

Nebraska, T. A. Kiesselbach.

New Mexico, Fabian Garcia, A. C. Cooley.

Oklahoma, A. Daane.

South Dakota, Charles McCaffree.

Texas, George R. LeBaron, B. Youngblood.

Utah, E. G. Peterson, C. L. Dunford.

Wisconsin, S. J. Uhrenholt.

Canada, W. W. Thomson, G. A. Cook.

Australia, Niel Nielsen.

South Africa, A. J. Bester.

France, J. M. Romagny.

This joint committee will meet at 8 o'clock.

PRESIDENT JARDINE:

Is there any further business?

MR. BAINER:

I desire, as a Texas Executive Committeeman, to call a meeting of the Texas delegation at 8 o'clock. You know I have been Executive Committeeman, but have recently removed to Kansas and, therefore, I cannot very well serve. It is necessary to elect some one to take my place.

PRESIDENT JARDINE:

If there is no further business, we will stand adjourned.

Morning Session

October 21, 1916, 9:30 O'clock.

PRESIDENT JARDINE:

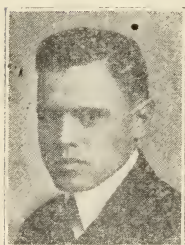
The hour has arrived for opening the morning session.

The first number on the program is a paper by Professor Throckmorton, of the Kansas Agricultural College, and he is going to talk to us on the relation of humus in dry-farming. Mr. Throckmorton.

Organic Matter in the Soils of the Wheat Belt

MR. THROCKMORTON:

The importance of maintaining the organic content of our soils is not receiving as much attention as the problem justifies. We have devoted years of time and large quantities of money to studying the cultivation and crop adaptation problems which are of great importance. However, these problems even if they are definitely determined, will not give us a permanent agriculture because no system is permanent unless it looks to the fertility of the soil.



It is a well known fact that organic matter plays a very important part in soil fertility in chemical, bacteriological, and physical ways. It is the decaying of this organic matter that liberates large quantities of our available plant food. It is the food of the nitrifying bacteria which makes large quantities of nitrates available for the plants. It makes the soil more porous so that it will absorb and retain more water.

Soils which have been cultivated for several years without the addition of organic matter in some form are rapidly becoming deficient in this material. The loss is more rapid in warm, dry regions than in humid sections and also greater in continuous grain farming than where a rotation which contains a grass is practiced. Thus, the climatic conditions and agricultural practices of the great plains region are such as to rapidly destroy this very important material.

Chemical determinations of native soils and adjoining soils cultivated to wheat for thirty years in Russell County, Kansas, show that the cultivated soils have lost 30.5% of their nitrogen and 34.5% of their organic matter. Similar determinations in Reno County, Kansas, show that the cultivated fields have lost 43.5% of their nitrogen and 51.3%

of their organic matter. These are not exceptional cases but two instances of what is happening throughout the wheat belt where crops are grown continuously.

The question which immediately arises is: How are we to increase the organic content of our soils? Many methods have been suggested, but all of them have not proven to be satisfactory. Three chief methods are in use in various sections of the country:

1. The use of green manure crops.
2. The application of straw and other crop residue.
3. The application of manure.

The Use of Green Manure Crops.

At various times it has been suggested that we plow under some green manure such as cowpeas, sweet clover, or rye, and thus increase the organic content of the soil. Such a practice has its place in agriculture but is not well adapted to the section of the country under discussion because these plants use large quantities of water in their development and demand the use of the soil during one season. In addition to this, they leave the soil too dry for seeding to winter crops the fall the material is plowed under and very frequently there is not sufficient moisture in the soil during the winter and early spring months to decompose the coarse material. The layer of undecayed organic matter will separate the surface soil from the subsoil, thus leaving the soil in poor condition for spring crops.

Experiments have been conducted at the Fort Hayes, Kansas, Experiment Station with green manuring crops compared with fallow in wheat production. The rotations followed were:

1. Fallow, wheat, corn, barley.
2. Cowpeas for green manure, wheat, corn, barley.
3. Rye for green manure, wheat, corn, barley.

In the first rotation where fallow was used, the average yield for eight years was 21.3 bushels per acre. When cowpeas were used in place of the fallow, the average yield was 13.4 bushels per acre, and when rye was used as the green manure crop, the average yield was 12.9 bushels per acre. In addition to the differences in yield there was considerable extra expense uncounted in seeding the green manure crops. In view of these facts, green manure crops should be used only as a last resort.

Straw.

The straw produced in the wheat belt is a very valuable by-product of the wheat industry and should be returned to the field instead of being allowed to decay in large piles in the field, or even worse, burned to get it out of the way.

Straw may be used satisfactorily in two ways—as bedding for livestock and later applied to the field, or applied direct as a surface dressing during the late fall and winter months. When applied in this way the straw will have decayed sufficiently to have no bad effect on the soil when plowed under the following season. In addition to adding considerable organic matter to the soil, straw will aid in preventing

blowing, in retaining the moisture that falls as snow, in preventing winter-killing, and will add considerable plant food to the soil.

Many objections have been made to the use of straw, but the detrimental effects have invariably been due to too heavy applications as a surface dressing or to plowing under considerable quantities a short time before seeding. The applications should not be more than one or one and a half tons per acre applied as a surface dressing.

Use Manure When Possible.

Undoubtedly manure is the best form in which to apply organic matter to the soil. It has all of the advantages of green manure crops and straw, and many more, for it decays more rapidly and adds much larger quantities of plant food. With manure as with straw, many objections have been made to its use throughout the areas of light rainfall. Some of these objections are due to too heavy applications, poor seasonal conditions, or are purely imaginary on the part of the farmer because he doesn't enjoy hauling and spreading manure on his fields. It is true that yields have been decreased from the use of manure in various places but invariably the decrease has been brought about by carelessness in applying very large quantities. Such applications will tend to cause the plants to make a very rapid and heavy growth of straw in the spring and thus use large quantities of water and not leave sufficient to mature the crop. Or, if the season proves to be extremely dry the very heavy applications will cause a burning of the crop early in the season and thus decrease the yield.

However, reasonably light applications will increase the present yields and aid in keeping the soils in good condition. Experiments conducted over the hard wheat section of Kansas during the last three years justify this statement. In 1914 experiments were conducted with manure on wheat in six localities. The average yield of the manured fields was 24.49 bushels per acre and of the unmanured, 21.45 bushels. In 1915 experiments were conducted in three localities in which the manured fields averaged 26.55 bushels per acre as compared with 20.47 bushels for the unmanured fields. The experiments were conducted in nine localities in 1916 with an average yield of 22.55 bushels per acre on the manured fields and 17.75 bushels on the unmanured fields. The average increase from the use of manure on wheat from eighteen determinations extending over a period of three years is 5.64 bushels per acre. The amount of manure applied on these fields varied from six to ten tons per acre. Heavier applications than this should not be made and lighter applications are advisable.

Therefore, if the fertility of the soils of the light rainfall area of the United States is to be maintained, we must keep more livestock and make the best possible use of the manure produced and also use the by-products from the grain fields.

PRESIDENT JARDINE:

How thick do you spread the manure?

MR. THROCKMORTON:

I believe at the rate of 5 tons per acre.

PRESIDENT JARDINE:

Is that as thick as you can scatter it?

MR. THROCKMORTON:

That is as thick as you can scatter it with any manure spreader on the market at the present time.

PRESIDENT JARDINE:

When would you apply it?

MR. THROCKMORTON:

During the late fall or winter months as a surface dressing.

PRESIDENT JARDINE:

Would you apply it to your wheat if you are growing in rotation with corn or sorghums?

MR. THROCKMORTON:

Yes, I would apply it in whatever place it was the easiest to get it on the ground.

Mr. Bainer here took the chair.

MR. BAINER:

I am sure we all appreciate this splendid address of Mr. Throckmorton's.

The next number on our program this morning will be one on the question of good roads. I am going to call on Mr. M. O. Eldridge, Assistant in Road Economics, Office of Public Roads and Rural Engineering, Department of Agriculture, Washington, D. C., who will speak to us on the subject of "Going in Debt for Good Roads." Mr. Eldridge.

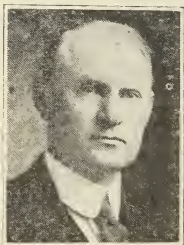
Going in Debt for Good Roads

MR. ELDRIDGE:

Mr. Chairman, Ladies and Gentlemen:

It gives me great pleasure to be here today to talk to you on this subject.

I am sure you know that Congress, at its last session, passed a bill providing for \$75,000,000 to aid the states in the construction of good roads in this country, and Mr. Page wanted to get here to discuss this subject with you, but was unable to do so.



My subject is one in which every one should be interested. The time has passed when it is necessary to discuss the benefits of good roads, because every one realizes that good roads are beneficial and the important thing now is to know how to get good roads. We are spending in this country every year about \$250,000,000 in building good roads. At the present time there are outstanding in the United States about \$350,000,000 of good roads bonds. If every dollar of that money were wisely expended, we would have good roads in a short time, but that is unfortunately not the case. If we could increase our economies along these lines, we could have good roads in a very short time. If we could reduce the number of road officials and increase the quality of those left, we would get good ones in a short time.

There are two ways of getting good roads. One is by direct cash tax and the other is going in debt. By all means, if a community is able to pay, it should pay as it goes. It should levy a sufficient tax to build the roads in the next few years and pay as it goes.

There are, unfortunately, many communities in the United States where that cannot be done and where it becomes necessary to borrow this money, the same as a farmer would borrow the money to buy a farm. If many farmers had to wait until they had the money to buy a farm, some of them would not have the farm at all. The same is true, in a good many cases, in building a system of good roads. We borrow the money and then we have the roads, while we are paying for them.

There is one advantage to the cash tax system and that is, if we assess a cash tax, we do not have to pay any interest. If a community will levy sufficient tax, they can build a good road system in four or five years, thus saving the interest on borrowed money. In every case where possible, it is advisable to pay cash for good roads. Especially in poor communities, however, it is advisable to go in debt.

In the first place, the benefits are immediate. Under the cash tax system we have to wait for our benefits. If we issue bonds we get the benefits right now and do not have to wait for them. We do not want to wait until we have to depend on the Golden Streets for a good road, so we want them in our lifetime. Many communities never will be able to get good roads unless they go in debt for them.

Another thing we get generally by going in debt for good roads is enough money to properly finance the undertaking. It means generally skilled supervision and that does not always go with the cash tax system. But if a county goes in debt it is usually wise enough to employ a skilled engineer to do the work and that is one advantage. Then, where we have a large amount of money to finance, it can generally be done cheaper because we can always build on the wholesale

cheaper than we can on the retail. If you build three or four miles a year, it is more expensive than building ten or twelve or twenty miles wholesale, because you can hire labor, etc., much cheaper.

On the other hand, where you are building just a few miles a year, it frequently happens that a county will have to invest several thousand dollars in purchasing equipment, as well as machinery, whereas, if the work is done by contract on a large scale, this is all furnished by the contractor and the cost is, therefore, less.

Of course, there is a disadvantage to the bond system, and that is you have to pay the interest on the money, but if you go about it the right way, the interest on the money will not cost more than the benefits accruing. Going in debt for good roads is an investment—it is not an expense, and we should look at it in the light of an investment. If good roads are going to be beneficial in dollars and cents, then we can afford to spend this money for interest. A man recently told me they invested in a bond issue in his country and the saving in hauling cost in one year's time, they have estimated to be about \$20,000. We should always consider those things before we issue bonds. We should look at several things before those bonds are issued, but, unfortunately, we look at many of them after the bonds are issued. I was recently told of a locality where they issued \$100,000 in bonds some four or five years ago, but they have not paid much attention to the roads since. The man who was telling me this wanted the Government engineer to look at them and see what should be done. I told him he was asking for a Government engineer now when it is probably too late to do any good.

In the first place, we should make a traffic study of the roads as to how much they are bearing at the present time and how great the traffic will probably be in the future. We should determine the traffic area, for that is an important matter. Engineers should go in advance and measure how much traffic is going over the roads at different times of the year, and then how much we can therefore afford to spend in the improvement of those roads. During the last five years, the Office of Public Roads conducted a study of economic conditions in eight counties in different parts of the United States—those counties issuing anywhere from one hundred thousand to a million dollars worth of bonds to improve the roads. They made a study of traffic conditions every thirteen days for a five-year period to determine the traffic condition. At the end of the five-year period we knew how much the traffic had increased. We found one thing in particular and that was that the traffic in some cases was much greater near town than it was far from town. We all know that in a general way, but we do not apply that in practice. In one case I remember the traffic was four times as great one mile from town as it was ten miles from town, and yet the authorities spent the same amount of money on the first mile as on all the rest. We should spend the money in accordance with the traffic requirements of the road. We do not need to build all roads exactly alike. In some cases we can afford to spend more than in others. A brick road or a concrete road will be absolutely essential close to the town where the traffic is heavier, but when we get further out, we can decrease the expense and put in a lighter road, and still further out a good earth road will do.

We also find that about 20% of the roads of the county carry about 90% of the traffic, therefore, it is not necessary to improve all the roads, but that 20% should be improved first. In one case we found where they had improved 45% of the roads, spending nearly one million dollars, spending more than they should have and improving more than they should have improved. That was the only county in which the saving on the bond issue was not enough to pay for the interest on the bond issue in 15 or 20 years.

We should, in improving roads, consider the land values also. In that particular study we made, we took a record of every farm of every one on the improved road, the first and second and third year, etc., and each year we found out what that farm was worth and you would be surprised when I tell you that the increase in land values in these eight counties as a result of the building of the roads more than paid for the improvement, but it will do it in almost any case. We should consider that fact in determining whether we are going to borrow money.

Then we should consider the relation of the road to the school. In many cases where good roads have been built, it is possible to bring together three or four schools, have better paid teachers and better teachers in the country districts and give the country children a better education. We found that good roads increased school attendance 10%. If the building of good roads will increase school attendance 10%, then, aside from the monetary consideration, good roads are a good thing.

Good roads should also be considered in relation to the church and social centers. Where there are good roads, we find people can drive longer distances to attend church and social gatherings.

There is another thing we should consider in connection with a road project before we begin to issue any bonds, and that is the matter of taxation. We should find out whether the roads are going to pay for themselves in the amount of taxes we have to assess and we should find out in advance. We should let the people know how much tax they are going to have to pay to get those good roads, and we should also arrange to tax in advance for the maintenance of those roads. We are spending enough money in this country for the building of good roads, but we are spending entirely too little for maintaining those roads. It is a crying shame to spend so much for construction but nothing for maintenance. Something should be set aside at the outset and kept for maintenance. This is made compulsory by law in Mississippi only. There they have to levy a tax of one mill for the maintenance of roads, and there they have the best roads in the United States.

Now, as to the kind of bonds we should issue. We have \$350,000,-000 worth of bonds outstanding in the United States and most of those are unfortunately sinking fund, long term bonds, which means a lot of money for interest and means they will be paid off at the end of the term, and you have to pay the interest on the whole amount for the whole term.

Let me read a paragraph from an article by Alfred D. Chandler, which appeared in the "New York Annalist." Mr. Chandler says:

"When it was revealed to the Finance Committee of the New York

Constitutional Convention that for every million dollars of New York's standard fifty-year sinking-fund bonds at 4%, the difference in interest between the sinking-fund and the serial-bond method was the astounding sum of \$98,000,000, while the difference in actual cost of the sinking-fund earned the accepted $3\frac{1}{2}\%$ was \$35,690,800, or even if it could earn 6%, was \$14,934,400, it brought that convention to an impressive realization of New York's past neglect on this score and of the needless expense attached to its present outstanding bonded debt, state and municipal, of about \$2,000,000,000, or about double the bonded debt of the United States."

The objection raised sometimes to serial bonds is that they do not bring as good a price on the market as the sinking-fund bonds. Let me read you what Mr. Chandler says about that:

"Some hesitation arose as to the receptivity of the New York market for serial bonds, all doubts of which happily were removed pending the sessions of the Convention, by the successful marketing on June 29, 1915, of New York City's first serial-bond loan for \$24,000,000, at a higher price than was obtained for a simultaneous sinking-fund loan of \$46,000,000."

So they have tried it out on the New York market and found one sells as well as the other.

You know as well as I do that in various parts of the United States we issue millions of dollars worth of bonds for an improvement that will not, in many cases, last over 10 years. You should consider the life of the improvement in issuing bonds and do not issue bonds lasting longer than the improvement itself. Concrete culverts and bridges are improvements that are considered permanent and we may issue long term bonds for work of that character. However, there is no road that is absolutely permanent. No permanent road has ever been constructed, and I doubt very much if one ever will be constructed.

Let me call your attention to the 30-year bond—the difference between a serial and sinking-fund bond covering a period of 30 years. The saving that would result if the people of the United States would issue serial bonds instead of sinking-fund bonds would be enormous.

It is a better plan to issue deferred serial bonds and not begin paying them off the first year, but wait for two or three years before the money is received, thus making an equal payment each year. If we issue sinking-fund bonds covering 30 years, say for \$100,000, bearing 5% interest, paid off at the end of the term, the total amount we would pay out at the end of that term would be \$203,490.30, that is, under the sinking-fund method. If we issue deferred serial bonds for the same amount, with the first payment beginning this year, interest 5%, and make a payment the sixth year and each year pay an equal amount, the total amount we would pay out would be \$190,000. Thus there is a saving of 13%. That is a saving worth considering, and yet we go on, in many parts of the United States, issuing these long-term sinking-fund bonds.

I want now to read a paragraph from the California Biennial Report, in which they refer to this matter:

"The aggregate of the approved state bond issues for 1914 is \$5,800,000, bearing interest at 4% and $4\frac{1}{2}\%$ covering a fifty-year period. It is calculated that the interest at the end of the time will amount to \$8,500,000, or, say, in round numbers \$3,000,000 more than the total issue. In other words, the cost to the state will be almost \$14,500,000 for the privilege of erecting \$5,800,000 worth of buildings. The interest as figured will average about \$170,000 a year.

In other words, a direct general property tax of say, five cents on the \$100 of assessed valuation for a term of four years easily would raise an amount in excess of the total of the bond issue, the money would be available year by year as needed, and there would be no interest or delay due to failure to sell bonds.

But inasmuch as the state's main revenue now is derived from a tax upon corporations and any bond indebtedness it may incur is payable out of such receipts, the saving to be effected by a direct tax, as suggested in the preceding paragraph, may not appeal to the people as much as it should."

In California for a good many years they have been using these 50-year bonds.

I believe this covers the subject as well as I can cover it without a paper, and in conclusion, I wish to call your attention to the Government exhibit in the Exposition.

MR. BAINER:

"We can consider ourselves fortunate in being able to hear such an excellent address on the subject of good roads, a subject in which we are becoming more and more interested every day.

The next number is to be given by a lady. We are very fortunate in having one lady on our program. Mrs. W. A. Warner of Claude, Texas. Mrs. Warner has done a great deal for the farmers' wives, especially in the Panhandle and plains of Texas, in the way of organizing them and helping them in their lines of work. Her subject is "The Farm Woman's Viewpoint." Mrs. Warner.

The Farm Womans' Viewpoint

MRS. WARNER:

I believe in God and I believe also in Man—and I believe if more men knew the right thing to do, more men would do the right thing.

Almost every thing and every body in this world are controlled by men. Home, school, church, state, money, markets, commerce, and even women and children,—all are subject to the laws made by men. and most men make the laws from their own viewpoint of life, so it seems to me if women, whose interests and lives are controlled by man-made laws, are ever to profit by any change, we will first need to shift man's viewpoint on any subject, whether that subject be a mountain scene or a human life—depend upon where we take our stand.

Let us put a new roll of films in our mental kodaks this afternoon

and take a few compartive views of the farm woman's life in its relation to her home and society in general. And I hope you will take these views home with you as souvenirs of this meeting and show them to the people of your town and community, else my long journey to this place will have been a failure. First of all—I see two young lives approaching the marriage altar. They are coming from different directions. They are bringing with them different interests, different ambitions, different possibilities, and even different names. They meet and in a moment turn their faces in the same direc-

tion and walk away together. But what direction do they take? Almost invariably they start on life's journey by continuing in the direction the young man was going, but to that young woman's life, it meant "The Parting of the Ways." There on that sacred altar she left her name, she left the care and protection of her father's home, she left her position and her profession, if she had one, and many, many young women have them. She left her monthly income, she left her freedom to go on following her own personal ambitions, she left all the past on that altar, and began an entirely new life, for the love of that young man. While he kept his name, and added her life to it. He kept his position or profession, or job, as the case may be. He continued his life work. He goes on growing and developing and his income increases year by year because he can devote his entire time and talent to the realization of his ambitions. No wonder men forget their marriage vows so soon when it costs them so little to become a husband. Had the words spoken on that fateful day have cost him as much as they have cost the young woman standing by his side, he would have remembered them to his dying day.



Cost of Becoming a Father.

Years pass on and one by one the children come into their home Have you ever thought what it costs to become a father, and who pays

the price? I have known men to become fathers riding to town on a load of wheat, and never knew it until some of the neighbors 'phoned and told them. I have known men to become fathers in Texas while they rounded up cattle and horses on the ranches of Nevada and Montana. I have known ministers to become fathers and never miss a sermon, lawyers become fathers and never miss a case; doctors become fathers and never miss a call, and farmers by the hundreds become fathers and never miss a day's work or a trip to town. I knew a farmer last winter who became a father six weeks after his tombstone was erected, and he was a good man and a kind man, happy in the anticipation of his future fatherhood—but another man at the threshing machine—gave him a drink of whiskey—and on the first anniversary of his wedding day, we laid him away robbed of his life, robbed of the joy of fatherhood;—and his beautiful young homeless wife is left to fight the battles of life alone for herself—and their child. A life and a home legally obliterated without a word of protest. And this very day thousands and thousands of men are becoming fathers, while their bodies are decaying in the trenches where they fell, under the false pretense of protecting their children, by destroying the father of another's.

In the beginning God created just one man, all the other seething millions have been born of woman. Through all the ages day and night, year in, year out, the whole world round, women have been kept busy bearing, nursing, rearing men, and with the progress of the years so great has become the demand for more men and so varied the destructive forces of life, that today in order to meet the demand and keep the ever broken ranks replete—women are forced to produce human beings at the rate of a soul a second, and there is no relief for all this toil and pain, for by the God-made laws of nature, this is woman's mission. Since the first home in the Garden of Eden it has been woman's duty to give life, and men's privilege without her consent to take it. Women produce nations, men destroy them. Woman risks her life to give a new life to the world,—man risks his life to rob the world of a life. The perpetuation of the whole human race has never cost a man a single physical pain or a drop of human blood, and that is why men who make the laws throughout the world are so indifferent to the needs of women and children.

Should Pay for Every Child.

If every time a child was born into this nation, our government was compelled to pay that child's mother a thousand dollars, I believe our government would take an interest in the preservation of that child. Last year in the United States alone 300,000 babies under one year of age died. The result of flies, filth, ignorance, poor food, over-worked mothers and diseased parents. And our government, the greatest government in the world, appropriated \$40,000 to study the diseases of children and \$800,000 to study the diseases of hogs. Why? Because our men thought more of hogs than children? No. It was because they knew more about hogs than children. It is men's business to raise hogs, and from their viewpoint they see the need of hogs, and they are in a position to command what their hogs need. There are 20,000,000

school children in our nation and 15,000,000 of them already have one, two, three or more diseases gnawing away at their lives. If 75% of all the cattle of this nation were diseased there would be a panic among the cattlemen and S. O. S. calls would be clicking into our government offices from every direction.

The preservation of the soil, the moisture and the livestock are great problems, and demand the thought and action of great men, but the preservation and education of the mother and the child is the greatest problem of the hour, and you men can help save us and our children if you will—but we cannot save ourselves and our children without your co-operation.

Next to bearing the human race the greatest work is to feed it. With every tick of the clock a new body is born to be fed, and this brings us to the question, who feeds the world? Is not the farm the source of all food? It is. And the farmer's wife is the greatest food producer in the world. If you cannot believe this statement let me quote the food contribution of one farm woman to her family of eight children. A few months ago I asked a young man to take an evening off—with his mother and make a record and place a financial value on the work she had done in the thirty years of her married life and compare it with the value of their farm. He did so, and in a few days I received the following report:

Meals served, 235,425, at 15c each -----	\$35,313.75
Garments made, 3,190, at 50c each -----	1,595.00
Chickens, 7,660, at 25c each -----	1,915.00
Eggs, 127,752, at 15c per doz. -----	1,596.60
Butter, 5,460 lbs, at 20c per lb -----	1,092.00
Milk, 21,900 gallons, at 10c per gal. -----	2,190.00
Lard, 1,500 gallons, at \$1.00 per gal. -----	1,500.00
Bread (loaves) 35,500, at 10c each -----	3,550.00
Cakes, 5,930, at 25c each -----	1,482.50
Pies, 7,960, at 10c each -----	796.00
Vegetables (bu.) 1,525, at 50c per bu. -----	762.50
Fruit, jars, 3,625, at 25c per jar -----	906.25
Fruit, fresh, 1,550 quarts, at 10c per qt. -----	155.00
Laundry, 177,725 pieces, at 3c each -----	5,331.75
Hours spent in sweeping, washing, ironing, scrubbing, 35,640, at 10c per hour -----	3,564.00
Total -----	\$61,630.35
Present value of real estate -----	50,000.00
Difference -----	\$11,630.00

The Psalmist must have been thinking of a Farm Woman when he said, "Her price is far above Rubies."

I tried the same test in a home where there were six children and the Mother had been married twenty years with the result that the work of the mother and children totaled -----	\$32,425.00
Value of farm (800 acres) -----	16,000.00
Difference -----	\$16,425.00

Both homes are in the Panhandle of Texas and the land was rated at \$20.00 per acre. I tried this test in another home where the mother had died and left a family of twelve members to be cared for by an eighteen-year-old daughter, and I found that the work of this daughter and the other children amounted to \$2,540.00 annually. Yes, there are duplicates in these figures but the duplicates will not cover the things not mentioned that is done by the women and children on the farm. I have not included a chicken, a dozen of eggs or a pound of butter that goes to market—yet the women on the farm produce 90% of all the poultry and dairy products consumed by the city—and the poultry business alone amounts to more than the cattle business of the nation. It is equal to the cotton crop and exceeds the wheat crop by \$400,000,000, annually. The conclusion deducted from these facts is that if a reasonable commercial value were placed on the work of the women on the farm it would equal in dollars and cents the total real estate values of the nations. But what does she receive for all her toil to feed her family and help feed the world?

Have you ever thought of a woman's cash value on the farm?

She has no time for rest or recreation, this unpaid servant of our nation. She seldom belongs to a church society, lodge or club. There are none within her reach. These are town and city luxuries.

* * * * *

Less than one third of our women live on farms, but this one third bear and rear two-thirds of all the nation's children, since 62½% of our children live on farms. This means that the rural mothers bear and rear four children to her city sisters' one, or an average of eight to two, or twelve to three.

* * * * *

There is not an acre of land in this whole country that was ever worth more than three cents an acre until some woman moved onto it and transformed it into a home for man.

* * * * *

Liberty Through Inventions.

Man's inventions are setting her free physically, the sewing machine, washing machine, fireless cooker, cream separator, independent thresher, the tractor and electricity are all lightening her labor. The telephone and automobile will soon set her free socially. I believe that of all the inventions of man's mind, the automobile is destined to do more to bring new life and new hope to the women of the farm than any thing that has ever been invented.

* * * * *

Outlook Promising.

The outlook of the farm woman never was so promising as it is today. The best thought of both men and women is being focused on her interests and the world is waking up to her worth, and as a final testimony of my faith allow me to repeat my creed:

I believe in God, and I believe also in Man, and I believe when more men know the right thing to do, more men will do the right thing.

1. And is it not true that most people take their stand on woman's problems with their backs to her?

2. If I were asked to name the most dwarfing, blighting condition in the married woman's life—and especially in the farm woman's life, I would say—It is her inability to realize her ambitions and her visions of a home, through the medium of her own toil and self-sacrifice.

Whiskey and immorality have destroyed millions of homes. Ignorance and inefficiency have destroyed millions more, but the inability of an honest, hard working woman to transform toil or talent into an independent dollar to use as she pleases is at the bottom of this universal unrest between men and women in the home; whether that home be on a farm or in a city.

Some of the most pathetic instances I have ever known have the long months of saving and pinching here and there for the sake of a set of silver knives and forks, or a pair of lace curtains. Women get so hungry for the little things that make their home attractive, while the fence corners and the sheds pile up with "out of fashion machinery." It does seem unfair for those who work so much to have so little and others who work so little, have so much.

3. If any of you will take the trouble to investigate the real situation you will find in this land of the free and home of the brave that half the taxpayers have no representation and half of the voters have no taxation. In other words—we place the penalty of taxation on women who work and sacrifice and save and pay men the premium of full representation and citizenship, who—will not work and waste and destroy all they can.

4. No stream can rise above its source, and the stream of life is no exception to the rule.

Our greatest men have never yet been born, nor will they be, nor can they be, until woman is as free as man to make all of her life she can. The masterpiece of man—may be a new toy—an invention, a picture or a new flower, but woman's masterpiece, like that of God's, is man, but before man can become a masterpiece woman must become the master-artist.

MR. M'CAFFREE, of South Dakota:

I believe it is only proper that we offer a rising vote of thanks to Mrs. Warner for this splendid address.

MR. BAINER:

The motion has been made that we give Mrs. Warner a rising vote for this address. Mrs. Warner, we desire to extend our thanks to you by this rising vote for your excellent address.

MRS. WARNER:

Mr. Chairman, I wish to thank this body for the opportunity to represent the women of our country.

MR. BAINER:

I have been requested to ask that the Committee on Resolutions and Nominations meet at once in the room back of the platform here.

I now desire to introduce the next speaker. We have with us this morning a man who has had a great deal of experience in Southwestern agriculture, Mr. John F. Ross, who is superintendent of one of the experiment stations located in the Southwest at Amarillo, Texas. The remarks he will make this morning on the subject of what the station is doing to help the farmers, will be given to you from a practical, and not from a theoretical standpoint. Mr. Ross.

How the Station Helps the Farmer

MR. ROSS:

I came down here to take charge of some of the exhibits in the Soil-Products Exposition, with no thought whatever of participating in this program, but Mr. Jardine captured me in the Exposition the other day and almost forced me to talk to you, so I will only make a few offhand remarks. They will doubtless be somewhat disconnected and very weak, following this noble address we have just heard.

Those who are acquainted with experiment station work know before I talk what we are doing, or at least what we are trying to do. The whole object of experimental work in this dry land country is to make possible the rearing of more homes and more men and women and the feeding of them. To make this possible, it is necessary that we find out what crops can be grown and how best to grow them. Unfortunately our Experiment Station at Amarillo does not take in live stock. We simply have to do with crops and we are trying to determine from the crops we know about, those best suited to be grown in that part of the country. After having found out what crops will grow there most successfully, the improvement of these crops will be the next step, and that will have to do a great deal with the cultivation of the soil. This work, although it has been continued for a number of years, is just starting, and we are just beginning to learn how to determine crops that are best suited. The Government, of course, is spending large sums of money on these stations and employing men who are working along certain definite lines.

At Amarillo, I have charge of the farm. Besides, we have a man who has charge of experiments in dry land agriculture and the work in methods of cultivation, soil moisture determinations and work of that nature. The Office of Forage Crop Investigations is also doing a large amount of work at our station and they have a man in charge. With these special men we hope to do something that will be of value to the farmer, but we do not get at this work like the people in the Extension work do, that is, we do not try so much to carry it to the farmer. We

aim to do the work, record all the data we get and publish this in the form of bulletins.

Before the station can do anything for the farmer, it is necessary for the farmer to take an interest in the station. Some do, but many more do not. They simply ride by and comment perhaps on the looks of the station, etc., but do not think of the relation that the station work bears to their work on the farm.



I hardly know what phase of the work to present to you that would be of the most value, but I will mention some of the results we think we can say have been obtained through our experimenting in the Panhandle of Texas.

We have found a few crops that grow very readily and rarely fail. We have found other crops that sometimes make large yields, but more often

fail to make yields that are profitable. Wheat is a great crop in the United States and is one that appeals more strongly to man than any other crop, unless it is corn. The people who have come to the Panhandle to invest in farm lands ask about wheat the first thing. They seem to think along the line of wheat because that is a crop that always has a market and has a definite value, which rises and falls, of course, with the amounts grown, but we have found that is not our greatest crop in the Panhandle country, although for the last two years preceding this one we have raised immense yields of wheat and more of it is being planted this year than ever before. However, it does not represent the best product of that country. We have found that the grain sorghums are the most dependable crops. In only one year while we have been experimenting there have the grain sorghums failed to make grain, and that year they made forage, while there have been several years that wheat barely made the seed that was put in the ground.

The average for the best variety of winter wheat for 10 years past, not including this year, is a little over 13 bushels, while the yield for dwarf milo, which is our best grain sorghum, is something like 28 bushels. Of course, wheat is worth more on the market than milo, but the difference would not be so great in money value as the difference in yield if the grain sorghums are used properly for the feeding of livestock. I think much more can be made from the yield per acre of grain sorghums than from wheat on the average. Even our grain sorghums are going out of sight in price.

So far there are only three grain sorghums that we would feel like recommending for general crops and they are milo, kafir and feterita. We grow a great many other grain sorghums at the Station, but we do not recommend them to the farmers for general growth. Some of them perhaps can be grown further north than the three crops named, but for the Plains country and for a large area of country surrounding the plains, both below the plains and in the breaks, these three crops are best.

We have a great many hybrids, some of which are worthy of much interest, if not of as great value as these crops mentioned. Besides finding what these crops will do, we of course raise some seed that is

distributed among the farmers—some of it by Government distribution in small quantities, which is considered unsatisfactory by many farmers, because they do not care to devote their time to growing patches of grain. After the Government distribution has been made we usually have left a surplus of seed, and by contract between our Chamber of Commerce and the Department of Agriculture, this seed may be sold and the proceeds used for making new improvements or keeping up those already made on the farm. So, in this way, we get a large amount of our seed distributed among the farmers. That is of value in getting good seed grown generally. I always try to encourage farmers to raise their own seed. They have much better chances to do so than we have, especially in the important crops of grain sorghums. We grow them in small plots side by side and they cross very easily. The farmer can keep his seed purer with less effort than we can on our Experiment Farm.

I cannot cover in my talk anywhere near all the work we do at the Station, but in this matter of seed, we have found out in every experiment conducted that home grown seed is the thing to have. We have tried it with oats and with wheat and with some of the grain sorghums, and in only a few instances have seeds from a distance given us as good results as those grown at home. Our experiment with winter wheat from seed originally from Kansas, and grown since then in California, Texas, and Kansas, and the seed exchanged every year, each place growing three plats—their own, and seed from the other two places, has proved that the seed they grow on their own land made the best yield the following year. So do not overlook the importance of raising your own seed and of keeping it pure.

I thank you.

MR. BAINER:

We will be pleased to have any questions, if there are any. If there are no questions, on behalf of the Congress, I desire to thank Mr. Ross for this talk. This will end our program for this morning and we will now stand adjourned for the noon hour.

Afternoon Session

October 21, 1916, 2:30 P. M.

PRESIDENT JARDINE:

We will first take up the matter of business. I am going to ask the Chairman of the Resolutions Committee, or I believe he has asked Secretary Welch to do this for him—to read the report of that committee. Mr. Welch will please read the report of the Committee on Resolutions. First, though, will you have the resolutions voted upon separately or as a group? If there is no objection, we will have all the resolutions read through and then voted upon as a group.

Resolutions

SECRETARY WELCH, (reading).

Executive Committee—

Resolved, That members of the Executive Committee shall serve for three years or until their successors are chosen and qualify; provided, however, that, when the Executive Committeeman from any state is not present at a Congress either in person or by legal proxy, the delegates attending the Congress may elect another Executive Committeeman to represent their state.

MR. McCAFFREE, of South Dakota:

I got the idea that an Executive Committeeman was to be represented by the members present from his state and that he would not then be removed from office.

PRESIDENT JARDINE:

Mr. Drummond, will you explain something about the Executive Committee?

CHAIRMAN DRUMMOND:

Under the old plan all the Executive Committeemen retired each year and another new Committee was elected. The institution has grown until it represents more than it did in its infancy and has various interests that require a continuity of some one in charge, but that person shall be active, and when he ceases to be active, he should retire. The Congress sessions at Denver provided that the Executive Committeemen should be elected for not one year but for three. At a meeting of the Executive Committee held last night the amendment as read was proposed, as I understand it.

It may be necessary to modify it, but that is up to the Congress.

SECRETARY WELCH, (reading).

State Participation.

Whereas, the legislatures of certain States have heretofore provided for the participation and co-operation of their agricultural educational institutions in the work of the Congress, and for the exhibition of their agricultural and other resources at The International Soil-Products Exposition; and whereas, such action has proven of great value to such States through the improvement of agricultural conditions and the attraction of immigration; and further, recognizing and appreciating the interest and co-operation of such States in the constructive work of the Congress, now, therefore, be it

Resolved, that we, the members of and delegates to the Eleventh International Dry-Farming Congress, hereby extend an earnest invitation for a continuance of such co-operation by States already interested, and that States not now represented in the Congress be cordially invited to take early action looking to such participation.

United States Congress.

Whereas, in again making provision for the placing of its magnificent and comprehensive exhibit at the International Soil-Products Exposition, the Congress of the United States has demonstrated an interest in and an understanding of the cause of better agriculture, which is most commendable, and therefore

Be It Resolved, That its co-operation in this great cause in which this Congress is equally interested is most thoroughly appreciated and

Be It Further Resolved, That this Eleventh International Dry-Farming Congress extends to the Congress of the United States an invitation to continue this participation and co-operation.

Canada.

Be It Resolved, That we extend to the Dominion and Provincial Governments of Canada, and the Departments of Agriculture of the various provinces our great appreciation of the interest they have shown in the work of the Congress by sending the splendid exhibits to be displayed at the Soil-Products Exposition and

Be It Further Resolved, That we hereby extend an invitation for a continuance of Canada's participation in the Congress and Exposition.

Mexico.

Be It Resolved, That we extend to the Government of the great Republic of Mexico our earnest appreciation of the interest and co-operation it has shown in the work of the Congress by sending its magnificent exhibit of agricultural, industrial and other products to be displayed at the International Soil-Products Exposition, and also for the participation in the Congress and Exposition of the peerless National Band of

Mexico, which is justly classed as one of the greatest musical organizations in the world. This enterprise, together with the attendance and co-operation of many influential citizens of Mexico, has been a strong factor in the success of the Eleventh Annual Meeting.

Other Agricultural Organizations.

Whereas, The co-operation of local and other organizations engaged in any line of work calculated to benefit agriculture and allied industry is earnestly welcomed, therefore

Be It Resolved, That an invitation is hereby extended to each and all of such organizations to send delegates to the next annual sessions of this Congress.

"Landless Man and Manless Land."

Resolved, That the Congress approves the sentiment lying back of improved legislation having for its object the bringing together of landless men and manless land.

Soil-Products Exposition.

Whereas, We recognize the great educational value embodied in the International Soil-Products Exposition, and realize that the results or research and experimental work can in no other manner be so directly and forcefully transmitted to the people who need this information, therefore

Be It Resolved, That we most emphatically declare for the permanent retention of the Exposition as a part of the Congress work and invite the fullest co-operation of all people and interests who are concerned in any manner with the cause of better agriculture and allied interests.

Resolution of Thanks.

Resolved, That the Congress extends its sincere thanks to the El Paso Advisory Board for its effective organization work during the year; to the Mayor, the Citizens, and the Commercial and Civic Bodies of El Paso for their hearty co-operation; to the newspapers and agricultural journals of El Paso and elsewhere for their readiness to assist in this great work; and to various associations, societies, and individuals who have contributed to the splendid success of this the eleventh annual session of the Congress.

Resolution of Thanks.

Resolved, That we extend sincere thanks to W. M. Jardine, President of the International Dry-Farming Congress, and to Mr. W. I. Drummond, the Chairman of the Board of Governors; and to Mr. B. K. Hanaford, Director of the Exposition; and to the assistants and others, who by their enthusiasm and continued vigorous labors have made the Eleventh International Dry-Farming Congress and the Soil-Products Exposition a great success.

A. F. Mantle.

Whereas, In the death of A. F. Mantle, who was recently killed in action in France, this organization has sustained an irreparable loss, and

Whereas, The tragic and seemingly unnecessary close of the life of this splendid man and his untimely removal from the field of constructive activity in which the International Dry-Farming Congress is engaged stands as an unerring indictment of the brutal theory and art of war, therefore

Be It Resolved, That this Eleventh International Dry-Farming Congress extends its sincerest sympathy to the Government and the people of Canada, and to the bereaved family of our lamented co-worker.

Rural Education in Agriculture.

Whereas, The best interests of the country at large can best be conserved by the most complete development of education in rural districts, and the proper application of education to agricultural problems; and

Whereas, The International Dry-Farming Congress is deeply interested in the development of agriculture and education and the closer association of both

Now, Therefore, Be It Resolved, That these the eleventh annual sessions of the Congress do hereby respectfully urge the General Government to do all in its power to advance the cause of education in rural districts and especially so along agricultural lines.

PRESIDENT JARDINE:

What is the pleasure of the delegates with respect to adopting these resolutions in whole or in part?

MR. McCAFFREE:

I move the adoption of the resolutions as read. This was seconded.

PRESIDENT JARDINE:

It has been moved and seconded that the resolutions be adopted as read. All in favor of this make it manifest by saying "Aye," contrary, "No." The "Ayes" have it and the resolutions are adopted as read.

Are there any additional resolutions any one has to offer?

I will now ask for the report of the Committee on Nominations.

SECRETARY WELCH:

On behalf of the Chairman of the Committee on Nominations I wish to submit the following:

For President—Governor Frank M. Byrne, of South Dakota.

For First Vice-President—Dr. R. H. Forbes, of Arizona.

For Second Vice-President—Dr. E. G. Peterson, of Utah.

For Third Vice-President—Dr. B. Youngblood, of Texas.

PRESIDENT JARDINE:

What will you do with the report of the Committee on Nominations?

MR. HOWELL, of Colorado:

I move its adoption. This was seconded.

PRESIDENT JARDINE:

It has been moved and seconded that we adopt the report of the Committee on Nominations. All in favor of adopting this report make it manifest by saying "Aye." Contrary, "No." It is adopted.

The speaker of the afternoon is a man who is Director of the Department of Extension in one of our leading agricultural states in the Great Plains area. Mr. Cooley is doing a good work in New Mexico and when we found it was possible for him to be here, we asked him to talk to us this afternoon. We will ask Mr. Cooley to present some of the work he is doing in New Mexico.

Station Work in New Mexico

A. C. COOLEY:

Mr. Chairman, Ladies and Gentlemen:

I fear what I have to say here this afternoon will not be a fitting climax to the interesting programs we have already heard.

However, I feel there is a very important work that is being carried on in our country today that we have not said a great deal about and it is that work I would like to bring to your attention for a little while this afternoon.

The Extension Service has recently been organized throughout the country. We know in the past that there has been a great demand from the rural people for more practical information that they could use upon their farms and, for a long time, it was not possible for the rural people to get the information they desired. The information was not available, and, with all due respect to the vast amount of literature that has been published by state and national experiment stations, they, in the past, have failed to reach the farmers. The information, that has been accumulating for a number of years, has failed to reach the rural people, and of course, that is the purpose of the gathering of this information—that it might get out to our rural people in order that their farms might be made more profitable. For a number of years we found the only source of extension work that was being carried on was through the Experiment Stations. At first bulletins and circulars were sent out, instructing the farmer, or rather, giving the farmer the results of certain investigations that were carried on at these various stations, and later we found the farmers or the rural population made a greater demand on the stations. We have sent instructors or station men in

person to instruct them along various lines of agriculture and this became a burden on the station people. The station men had so much work to attend to at the College that they were not able to meet the many demands made on them, so through the co-operation of the business men and the rural population as a whole, this matter was brought before the Congress of the United States and aid was there asked that some more practical means might be provided for giving out this information. The result of this request was the passage of the Smith-Lever Act, which made our present extension work possible. It will not be necessary to explain the Smith-Lever Act, because I am sure you are all more or less familiar with it.

After the passage of that act, extension organizations were perfected in nearly all states. This was not, however, the first extension organization that was perfected, because a good many of the states several years ago saw the need of such an organization and perfected one at their institutions to carry on this most important work.

Just what is Extension work? I think Doctor True of the States Relation Service of the Department of Agriculture has given us a good definition of extension work, which I wish to give to you. He says it is a permanent system of practical education for the rural people outside of the schools. We have been paying a good deal of attention to the boy and girl who had the time and money to attend college, but now this work is provided that the boy and girl out on the farm, who do not have the money and whose parents do not have the money to send him or her to college, can also receive some benefits of this vast amount of investigation work that is being carried on. Or, in other words, that the college might be carried to the very door of the farmer, or that the college campus might be extended to the borders of the state and that each individual who is interested in agriculture, or home economics, might get the information, so far as it is available, that they desire to help them in their work in making better homes. The purpose of extension work is the dissemination of useful scientific information concerning agriculture and home economics among the rural people.

The way in which this knowledge is disseminated is through the various agricultural organizations that are found in a state, through the commercial clubs, through the daily and weekly press, bulletins and circulars that are written in the farmer's language that he can understand. Too often, in the past, our bulletins have not been in the language that the farmer could interpret and he laid them aside and took no notice of them, but that has been changed and the information of the bulletins sent out is written in a popular language and we find the farmer is taking advantage of it.

The source of all this information comes from the state and national experiment stations and from the experiences of the farmers themselves. We find that the greatest information that is of most importance to the farmer, is the information that is gathered from his farm or his neighbor's farm, and given to him.

The Extension organization is a large one and it would not be advisable to take time here to go into detail on extension organization. Therefore, I wish to mention only briefly three lines that are being

conducted in New Mexico today and also, of course, wherever extension work is organized. These are the county agent work, the boys and girls club work, and the home economics work.

I find the county agents are really the men who are getting the information to the farmer and who are really finding out what the farmer needs and helping him to solve his problems. It does not make any difference how much valuable information a station may work out, if it is not possible to make that available for the farmer, it has then lost its value, and by having a practical as well as a scientifically trained man to go out and meet the farmers individually and in groups and in meetings, seems to be the only adequate way in which this information can be given out and the only way in which the farmer is able to get it so he may use it. So we say the county agent is the connecting link between the farmer, the experiment station and the Department of Agriculture. By having such a man in the field, all these sources are connected. If the farmers have problems to solve, they have a medium through which to get the information to the station and to the Department.

I believe we can say the Extension division simply acts as a large switchboard that connects all the sources of agricultural information, or a large hopper in which we pour the grain we wish to grind. The material from the Department and the various stations is taken there, to the Extension division, and all put in this hopper and there prepared in the farmer's own language so it can be given to him so he can use it. We consider it is the business of extension workers to be able to go through all this material and to sort out the wheat from the chaff and present the material to the farmer.

One of the big problems is the method of presenting that information. It is possible that we get into a community and we find that the people are very backward, while in another community they are very much enlightened on that particular subject. We might say one community knows considerable about dairying and another knows little, so the methods used to present the dairying to those two communities would be different and we would have to approach them from a different viewpoint. The most effectual way of teaching farmers is by demonstration. We do too much talking, in telling the farmer what he should do when if we would carry on some very effective demonstration, that would illustrate our viewpoint, he would not fail to understand us and then would be willing to carry out our suggestions. So I say the most effective way of presenting a subject to our rural people is by demonstration methods, because we are all human and I believe we get more through our eyes than we do through our ears, and that is our method in presenting agricultural information to the farmers today—just as much demonstration work as we can possibly give.

The principal lines we are working along in New Mexico can be grouped into five classes—those in relation to soil, in relation to crops, in relation to livestock, markets and the farm people themselves.

We are finding it a difficult problem to maintain the fertility of the soil. Another great problem we have is that of drainage. As to

methods relative to our crops, there are the introduction of new crops and then simply taking crops that are already being grown there and standardizing those to find out which crop is the most profitable one to recommend in that particular community.

We find that, while our work is very new, last year in New Mexico, there were 135 different farmers who received their seed wheat and other seeds from the offices of the county agents. I appreciate the fact that this is not a very large number, but we have only been organized a little over a year, and this certainly shows the farmers are taking advantage of the work. Three county agents were successful in getting 126 farmers to feed more livestock on their farms. High grade cattle were brought in through the influence of the county men and animals were treated for blackleg.

I feel that one of the greatest questions we have to solve is the marketing of crops. We find all the farmers are saying: "It is not a question of producing more but of selling what we do produce," and this first year, along market lines, we were able to dispose of \$196,000 worth of farm products, and we hope to be able to put a market man in our state on January 1.

The people in New Mexico, especially the native people, are very much behind in agricultural development. I believe we are further behind than any other state in the Union. When you realize that the greater portion of the people of New Mexico are native people and that perhaps a very small percentage of them speak the English language, you will realize the Extension Division has rather a hard problem before it in helping the people. We have one native man who is working and doing wonderful work. This demonstrates to us the fact that these people can be reached and will develop into good farmers if we have the right men working with them.

I do not believe I had better take more time because the Extension work is a subject that is large and one on which we might spend several hours, but I certainly feel there is no work today that is doing more for our rural people than this Extension Service and the thing we need most is men who are converted to the work, who believe in it and who are willing to go out and work with the farmer, because he is the man who needs the help more than any other man, and not only the farmer but the farm woman, for we are not overlooking the home economics side of the work.

PRESIDENT JARDINE:

While our government and state machinery is quite inadequate to cope with present-day conditions, we are nevertheless making rapid strides in the right direction. What Mr. Cooley has told you as going on in New Mexico is going on in every state today. It is the means of bringing, in a practical manner, the results that are being worked out on the experiment stations and the farms themselves.

This ends all the regular papers on the program. We have the remainder of the afternoon to ourselves to discuss matters and a num-

ber have suggested their desire to address this audience informally for a few minutes. I am going to call on a representative from Wisconsin, Mr. Urenholdt. We will set a 5-minute limit on these talks first, and see how that works. Mr. Urenholdt.

MR. URENHOLDT:

I am an every-day farmer and not a speaker, but perhaps I could have a few things of interest. I have listened to a lot here and if I had not listened to Dr. Peterson, I would not have dared appear. All those things were good, but it seems to me it is still necessary to do one thing and that is to get the right spirit in the farm girl and boy, and to do that I do not know a better method than adopting a good method of teaching them good citizenship and to be a little proud of being a farmer boy or girl. The Government of Denmark has a splendid school system for the farmer boy and girl who does not have the means of obtaining an education and when they reach the age of 18 or 19 begin to want more education. All who attend that school must get support from the Government. There they hear the best that can be heard anywhere about art, music, literature and other good and useful things. They do not specialize, of course, because they are only there six months and they cannot afford to spend three or four years for a regular education. When those boys and girls go home they take hold of the problems there with a better spirit and a better heart and they are proud of being farmer boys and girls. You do not know how much influence that has had in Denmark. The result is that at the present time three-fourths of the Congress are plain farmers, and one-fourth are laymen, business men and land men, but the farmers control everything. They are the leaders in organizations of all kinds.

If we could have a school of that kind in this country, I think it would do much toward making the farm boys and girls not only contented with their lot, but proud to be on the farms.

I thank you.

PRESIDENT JARDINE:

I do not know that any one has given us any sounder advice than our friend from Wisconsin. One of the good methods we could advocate here would be taking care of our teachers and taking care of the education of our rural children. Young girls, born and reared in cities, cannot go out and teach those children with any benefit to the children. As our friend says, all the changes in Denmark have been brought about during the last fifty years and now the farmers themselves have control of the government. We cannot use all that is being worked out there but there are many valuable lessons we can use here.

We have a young man from New Mexico by the name of Mr. Powers, who is giving special attention to handling livestock on the range and he is going to tell us what he feels the extension people ought to do to help the cow man. Mr. Powers.

MR. POWERS:

I am not going to tell you so much about things that would be of interest, but I am going to appeal to you for help, more than anything else. I represent a big cow district. While my particular location is in New Mexico, the territory extends over 300 miles. It seems a pity that more of the cow men do not realize the benefits that could be realized from this Congress. The sole reason is because they do not know about it. It is up to us to teach them and I believe it is going to come through the Extension Division. Let me add the silo, because it will be a great help to the cow man. If the cow man does not depend upon the dry sion Division that the help will come.

1910 was one of the hardest years this westen country has ever seen. More cattle died that year than any other. Thousands lands for his welfare, I do not know who does. It is through the Exten- of them were shipped out and left the country without any cattle. In 1912, '13 and '14 we had good years and the range was good, but the stock was gone. The stockmen had been breeding up their stock, but after 1910 there were no stock left, so the ranges were stocked with the Mexican cattle. It is disgusting to ride over the country now and see these Mexican cattle all over our prairies. From this town you may go east to San Angelo and see them all the way. When the cow man wants to get rid of them, he finds the buyers are not looking for that kind of cattle.

It used to be that a few cowmen owned the entire range and they could go anywhere, but today there are small tracts and a man cannot afford to move, and they cannot afford to lose the cattle. The cowman does not know how to feed his stock. They have recently tried feeding cotton seed cake and they do not know the first thing about feeding it. It is up to the farmers and the Extension Division and the agents to teach them how to feed their stock. A cowman does not consider the future, but the present. He does not think of preparing for a very dry season or an unfavorable one.

At the present time there are cowmen in distress. They do not know what they are going to do. If you go into their homes, you do not find any literature of any kind and nothing to teach them better methods.

In one county I recently asked the county agent what he was doing for the ranchman, and he said they seemed to be getting along all right and did not seem to need much. The cowman hates to admit his condition. It is up to the county agent to do something for them. If a cowman comes to the conclusion the agent is trying to do something for him, he will get the glad hand.

Another thing I have in mind is the lack of harmony between the farmer and the cowman. Whenever a farmer finds a chance to stick a cowman, he always takes advantage of it and when the cowman finds the farmer wanting to buy cattle, he sticks it to the farmer. It is up to some one to bring about better feeling between the cowman and the farmer. The cowman does not like to be called a farmer, but it has to be fixed somehow and I believe it can be remedied through the Extension Division. I thank you.

PRESIDENT JARDINE:

I think you will all agree with me that Mr. Powers has given us some very valuable suggestions that will be good for Arizona, Texas, New Mexico and even for Kansas. Up there we have regarded the grass lands as capable of looking after their own interests. We have spent lots of money looking after alfalfa and other crops, but we have failed to look after the pastures and grass lands. It now requires about six acres to carry an animal through a year, and six years ago it required about three acres to do so. We have to work out a method of carrying the same number of animals and yet bringing the pastures back to the original degree of grass. It has been found that pastures can be rotated just as we rotate crops. Divide the pasture into three fields and pasture number one the first year, and leave the second fallow, and leave the third until the seed is set, then turn the animals on it and they will thresh out that seed and tramp it into the ground. The whole idea is to allow a pasture every two or three years to set seed and allow new plants to grow. The only plants that are fit to grow on the ranges of this western country are the ones that grow there. We have spent thousands of dollars in bringing in new plants and none of them have been as worth while as the ones originating there.

Are there any others who wish to be heard this afternoon?

MR. DUDLEY, of New Mexico:

Mr. Chairman, I wish to say a few words.

Our friend just mentioned about the cattlemen coming to the farmer for help and he does not seem to understand the feeling that lies between them. We all know that years back when the farmer began to venture out and string wire fences around, there was a great feeling, and I have had the opportunity this summer of being placed where they are trying to homestead and a few men are trying to hold the ranges. It seems as though we ought to forget all these things.

I came down for what I could get out of this Congress. I have attended both Congresses and one thing I have not heard discussed quite so much as I would have liked, and that is marketing, and organization of the farmers toward marketing. Of course we all know we have to organize before we can market successfully. There is no chance to market successfully without organization. I think this should have more of a place on the programs of this organization. I thank you.

PRESIDENT JARDINE:

Is there any one else?

H. B. LINK, of New Mexico:

I want to answer Mr. Dudley about marketing and organization. We have been dairying in this valley under the Elephant Butte project about 14 months. It all started with our county agent. He got our farmers interested in dairy cows and then our bankers interested in

furnishing money to the farmers. One reason the farmers are going to come out all right in this is because of this splendid dairy association we have here in this valley. You remember not long ago when the country had a test of the power of dairy farmers when those around Chicago went on a strike and refused to ship any more into Chicago until they got a higher price for the milk. Our farmers shipped on this plan for six months. At the close of the six months the demand for milk had fallen off and they found themselves with the milk on their hands. Then they decided to have a dairy plant of their own and run under the direction of the association. They are equipped to handle milk of the highest quality. The best thing about the Association is that it is paying out. They started at 20 cents a gallon and found they could pay more, so they raised to 21 cents. Last week they had a meeting and decided they could pay 23 cents a gallon. That is an illustration of what a good organization they have. Of course, they have had some troubles among themselves in meetings, etc., but they are getting along splendidly and are all well pleased with the results thus far obtained.

PRESIDENT JARDINE:

This organization of which Mr. Link speaks was just being established when I was here in July. There are organizations like this growing up in our states and they are passing the good news to all others, and there is no question but what we are headed in the right direction and there is no cause for pessimism.

Three of our most important addresses will have to be read, for the reason that these speakers found it impossible to attend these sessions. The first will be an address by Mr. L. D. Sweet, of Denver, Colorado, on the subject of "The Commercial Possibilities of Potato Growing." Mr. Sweet is eminently qualified to inform us on this subject:

The Commercial Possibilities of Potato Growing

Through their Departments of Agriculture our Government and the States have been co-operating for many years to help the average farmer of the country to a better knowledge of farming principles and practices, to the end that better results might be obtained. The latest developments along this line have been the County Agent movement, to give personal assistance to the farmers in the way of information and demonstration as to better methods of farming operation and management, and the establishment of an Office of Markets to co-operate with the farmers in devising better ways of marketing his crops. These methods place at the service of the American farmer of today, the most expert advice with regard to his farming operations, and also expert assistance in the proper marketing of his crops.

The average farmer is rapidly learning that to obtain the most satisfactory results from the operation of his ranch or farm, he must adopt a proper rotation of crops that will keep his land clean and free from disease and in a proper state of fertility to produce good crops. This rotation, to be profitable, must contain at least one good cultivated or cash crop, and one of the best of the cultivated crops for the western section of the country is potatoes.

Potatoes, however, are grown to eat, although most of our growers have never stopped to consider this fact particularly. They have been raising potatoes to sell and have considered only the market price and the best yields they could get. They have not realized that the more delicious a cooked or baked potato tasted and smelled the more demand there would be for it and the greater the consumption. A really good quality potato, when properly cooked or baked, is delicious in flavor, with an appetizing odor and is eaten with a relish, whereas a poor quality potato that is soggy and tastes earthy or is indifferent in flavor, is not relished and very few people want a second helping of them, with the result that there is very little demand for such a product and the price naturally will be very low.

The consumption of potatoes greatly decreases when the quality is poor, and increases proportionately when the quality is good. In this country the consumption of potatoes per capita is less than one-half that of any other country where potatoes are a staple article of diet, and this is largely because of the poor quality of the potatoes we have grown. In actual food value potatoes are very cheap as compared with other foods, and they are also wholesome and very palatable when the quality is good and they are properly prepared, but when they are poor in quality or improperly prepared their nutritive value is largely lost.

I firmly believe that if the potato growers of this country would unite to grow only high grade potatoes, with fine flavor and good food value, the per capita consumption of potatoes in this country would be practically double what it is now.

The yield of potatoes on many farms has been decreasing until it became too low to be profitable, and this is caused largely by lack of care in the selection of seed. A potato does not produce like itself, but like the hill from which it comes. As selected by most of the growers, their seed potatoes come largely from poor hills or only fair hills and rarely from the high yielding hills, because most of the potatoes taken from high yielding hills are so good that they are sold as market stock and consequently very few are used as seed. The natural result follows that, planting continually from inferior seed, the crop yields become smaller and smaller until they are no longer profitable. The same law prevails in the growing of potatoes as in all other plant and animal life; namely, if you want the best crops you must plant only the best seed and breed only the best animals.

Then, the question is asked, "How can we get such good seed? The answer is, to practically all of our northern growers at least, "Raise it yourself." By growing a separate seed plot in which each year you plant your best selected seed, and from the seed plot selecting your seed for the next year's field crop, after reserving the very best for the fol-

lowing year's seed plot, there is no question but that you can keep both the yield and quality of your potatoes steadily up to standard. By being careful to select only true-to-type seed from hills that have given very good yields and planting them in seed plots, and using only ground on which the crops have been properly rotated, it is only a question of a few years when the average yields will be doubled and trebled.

The claim has been made, however, and apparently with some basis of fact, that in some sections potatoes cannot be raised because of some peculiarity of the soil, but the writer is inclined to think that most soils can be made to produce potatoes abundantly, if the soil is filled with humus and properly tilled preparatory to planting, and good seed is used, together with proper methods of growing the crop. At least it has been demonstrated repeatedly in soils that the farmers of the vicinity claimed would not produce potatoes, that all the soil needed was the addition of plenty of humus, with good vital seed and right methods of handling the crop, when very good crops of potatoes were harvested.

To grow a good crop of potatoes the soil must contain plenty of humus, which helps to provide food for the potato plant and also vastly increases the water-holding capacity of the soil. 100 pounds of sand will hold in suspension only 22 pounds of water, but 100 pounds of humus will hold 196 pounds of water before becoming thoroughly saturated. Without a considerable amount of humus in the soil it is useless to attempt to grow potatoes commercially.

It was formerly claimed that potatoes could not be grown profitably in a commercial way on the non-irrigated lands of the west, but at Monument, Colorado, some years ago they demonstrated conclusively that potatoes could be produced on our non-irrigated lands in most satisfactory quantity and quality. Unfortunately the growers there overdid the matter, and by constantly cropping to potatoes, with lack of care in the selection of seed and the consequent development of disease, the production was soon reduced to an unprofitable point. Since the advent of the County Agriculturist in that district, however, they have been adopting better agricultural methods and have been rotating their crops, with the result that they are beginning to raise potatoes again in that vicinity and hope soon to regain their old reputation for raising high grade potatoes in large quantities.

One of the great requisites in successful potato raising is the proper preparation of the seed bed, and another is the use of good seed. To prepare a proper seed bed for potatoes, land should be used that has been in alfalfa or some other legume for a number of years. Such land should be plowed in the fall just deep enough to turn under the vegetation, say about $4\frac{1}{2}$ inches, and then left rough so as to catch all possible moisture during the winter for storage in the subsoil, and also permit the action of the frost and elements to disintegrate the vegetation and turn it into humus. As early as possible in the spring the ground should be again plowed, and deeply, ten or eleven inches, if possible, and then harrowed repeatedly until a fine, loose seed bed is formed with plenty of available moisture.

Then, use good seed—not culls left over after marketing the best of last year's crop, but seed that has been selected true-to-type of the variety to be grown, that is of good size, of vigorous vitality, free from disease, and preferably that which has come from fields that yielded very heavily the previous year. Test the seed carefully by cutting off the stem end of a number of the potatoes to see that no fusarium or other internal disease exists, then treat all the seed thoroughly with corrosive sublimate to kill any scab or rhizoctonia that may be present, and plant in rows about three feet apart and in hills as far apart as the moisture in the ground may make advisable, using seed pieces or whole potatoes (preferably the latter) of not less than three or four ounces in weight, so as to insure the plant an ample supply of food until its root system is well established. Then cultivate frequently to let in the air, which is just as essential to plant life as to animal life, and to conserve moisture, and the fall harvest should result in a fine crop of good, marketable potatoes of fine quality. For such stock there is usually an active demand at fair prices.

To obtain the best results in the marketing of the earlier varieties of potatoes, those which are usually consumed within a short time after digging, care must be exercised first in the harvesting, to prevent all unnecessary bruising and skinning of the potatoes which soon causes them to look black and unattractive, and next, in the screening to see that all dirt and extra small potatoes are removed before sacking. The sacks should be uniform in capacity, say about 110 lbs., to simplify handling by the various dealers, and be tightly sewed to avoid the shucking and bruising of the potatoes in handling.

The later, or keeping potatoes, as far as possible, should be allowed to grow until the frost kills the vines, then lie in the ground for a week or ten days longer before digging, to thoroughly mature the potatoes and harden their skins so they will bear ordinary handling without skinning. Badly skinned up potatoes not only are unattractive in appearance and likely to bring a lower price, but are much more liable to rot under storage conditions than those with whole skins. These should also be put up in clean sacks, with a uniform capacity of about 110 lbs when tightly sewed up. They should be sorted in compliance with the requirements of the market to which it is intended to ship them. As these requirements vary in the different markets, a classification that would be suitable for all can hardly be made now, but the tendency is becoming more and more pronounced, especially in the hotel and high class restaurant trade, to demand that potatoes be sorted to a fairly uniform size of from eight to ten ounces, so that each potato will supply one service and will also bake or cook more evenly. For household service the six to eight-ounce size seems to be best adapted with least waste. The standardization of size in the sorting of market potatoes is now being taken up by the various potato growing associations of the United States, as well as the National Association, and some standard will doubtless be adopted in the near future.

PRESIDENT JARDINE:

The secretary will next read the address of Mr. Harold Hamel

Smith, of London, England. Mr. Smith is the editor of "Tropical Life," and his address is on the subject of "Food Supplies During and After the War."

Food Supplies During and After the War

One result of the European War will be, in fact, one can well say that one result of the war has been, to make the world at large take stock of its larders and to note, with dismay, how the cost of replenishing them tends to increase just when we are least able to afford the money owing to the stoppage or curtailment of trade (outside the requirements of the combatants) throughout the world. Worst of all is the prospect, or rather the certainty that the expense of feeding the families is bound to increase whilst the incomes of the buyers, at any rate in Europe, is equally certain to decrease for some time to come.

Ask a butcher what effect the war has had on his trade now that the cost of meat is between 40 to 50% dearer than it was before the war (beef today is 1-4 to 1-6 lb for topside against 9d to 11d lb two years ago) and he will tell you, at least those I have asked did, that the public spend, as much money on meat as before but are unwilling to spend any more, and therefore, the higher the cost the less the weight delivered, and so, although the cash paid and received may not alter much, the amount of meat consumed must be very much less. This, if it continues, may exceed the limit of public good for, if in the past the man who works in the city has tended to eat more meat than was necessary or even good for him, that does not say that his dependents at home did, and nowadays, in these times of stress and anxiety all of us want to keep up our stamina to be able to throw off the trials and troubles of this wicked world—young people most of all. It is the young people I am chiefly thinking of whilst writing these notes, for they have to carry on the work of the world, and repopulate it when peace comes, and so, if we want a healthy people in the future it behoves us to look around and keep some food in the larder for those of today with such a task before them.

Therefore, as one of the direct victims of the high prices caused by the war, placed as I am in this city of London where all are consumers and none of us can produce, although you in America, Canada and elsewhere have not escaped altogether, judging by the cartoons I have seen of "the innocent onlooker" being hit by the cannon-ball of the increased cost of living, I would like to take this opportunity of discussing with you, unfortunately not in person, how you can help to fill our larders for us in exchange for goods from this side, at a fair profit to yourselves, without having to pinch us too severely as to the cost during the next two or three years.

This discussion is well placed in such an assembly as there is no doubt that many semi-arid districts can greatly increase their output

with the help of a little capital from agricultural, co-operative or other banks, a little encouragement and guidance from the authorities, and much care and experience on the part of the farmers.

The head of Forest crop investigations for the U. S. Department of Agriculture, Mr. C. V. Piper, when discussing a possible increase last year in the output of the forage crops for four-legged animals put a question which can be applied with even greater force today to the output of foodstuffs for us two-legged beings when he asked "How much of the dry lands of the West can be brought into permanent and profitable cultivation?" Mr. Piper of course referred only to the Western States of N. America, but I am asking myself the same question of the dry areas in Brazil and elsewhere in South America, in Ceylon, Canada, Russia, Australia—in Spain, in China, in fact I suppose in all countries nearly, and since it is so, all the better for us in the cities, as goodness knows we shall need the food badly enough. Even I, a man, cannot look into the future without some anxiety as to ways and means, and this being so, how will it go, I ask you, with the dependents of those four or five millions of men that have been killed or injured in the war, and whose numbers are mounting up at such a terrible rate, hour by hour, day by day. It is more than mere selfishness, therefore, that causes you and I today to consider how we can assure the output of the largest amount of food possible to sell to those who have none, and who, unless they can secure their supplies at rates lower than those ruling, even before the war (when the world as a whole was prosperous and had savings in the bank), will feel the pinch of poverty due to the high prices very keenly if, indeed, they do not go under altogether, the women especially.

At present money is being doled out as army pay with a comparatively free hand, but directly the men are disbanded this will cease and the women and their men folk (maimed or well) will in thousands of cases stand up and say, what can we do to get food as the cities are overcrowded with people like ourselves, i. e., non-producers of food, of whom there is a glut on the labor market, so we must turn to the land first to feed ourselves, and in the aggregate, to sell the balance of our crops to suend to others in exchange for clothes, etc.

Roughly speaking, I hope, therefore, that the experienced dry-farmer will push more out into the open and plant up new areas, as they have the knowledge of how to do so which these future recruits to the agricultural world will altogether lack. Fertile lands elsewhere will be broken up and laid down in wheat, and everywhere we are urged to increase the number of cattle, pigs, poultry, rabbits, etc., to bring grist to the mill. The big man must become bigger, and fresh recruits must come in at the other end, to add their "mites" to the general store.

I am afraid the foregoing, savors more of politics than dry-farming; if so, I apologize, but I have included them to show that never has there been the need that exists today, to go ahead with dry-farming methods so as to produce more on some areas than has hitherto been done and, more important still, to urge you all to open up fresh sections and bring them under cultivation as well. If before the war, the increase in the population of the world tended to outrun the increase of its food supply by two or three to one, it certainly will do so, when the war comes to an

end, and, in fact, it is doing so today—doing so very rapidly, too. I, therefore, as a man of the town—a non-producer of food of any kind—may be excused if for once I stop discussing how to plant, and only talk of where to plant, viz., in every nook and corner you can come across, wet or dry, drained or irrigated, up on the hills or down in the valley. In spite of the horrible depopulation that the war is bringing about, those that remain will still continue to outstrip the supplies obtained by those that are left, unless you come to our aid and utilize lands at present of little or no value to increase the output.

Dr. Durand in 1914, you will remember, touched upon the subject (See Wichita Proceedings p. 113), and the case today is much worse than it was when he addressed you. At that time the war had only recently started and yet he told us that to increase the production of food, more land must be used, or more must be got out of the land. Either of these may be accomplished in two ways, by more labor or by more science. Necessity, I believe, will produce the labor; for we will have to go back to the beginning in many things, and the beginning means agriculture for city life and factories came long after. Trade and commerce are the daughters of agriculture, not the mother.

Dr. Durand then went on to say that, taken the world over, there is still much unused but usable land. It will be necessary for us to use more and more of those lands where moisture is somewhat deficient. Some of the land will be better adapted to grazing and to forestry than to tillage. In arid and semi-arid sections, there are large areas capable of cultivation — — — — It is a familiar fact that Western Europe produces far more food per acre than the United States, which can, however, support many times its present population and obtain far larger yields of each particular crop. In the long run, the man who devises means of producing food where none was produced before, or of increasing the yield of the land, will be looked upon as a greater benefactor than any other discoverer or inventor. To Canada and America, therefore, I would say: obtain yields similar in size to what Europe can turn out, as shown in the following table, thereby taking steps to support many times your present population and send your surplus crops to us to buy, for we need them now, and shall need them still more in the near future.

To prove what I have just said is no exaggeration, I now beg to call your attention to the wheat yields per acre of the thirty following countries:

	Bushels per acre.		Bushels per acre.
(1) Denmark	44.90	(9) Egypt	26.32
(2) Belgium	36.43	(10) Norway	24.53
(3) Holland	35.53	(11) France	22.22
(4) Great Britain and Ire-		(12) Luxemburg	22.15
land	32.41	(13) Austria	19.92
(5) Switzerland	31.81	(14) Japan	19.33
(6) Germany	30.63	(15) Canada	19.03
(7) Sweden	30.63	(16) Hungary	18.44
(8) New Zealand	29.88	(17) Chile	17.55

(18) Bulgaria -----	15.46	(25) Argentina -----	10.26
(19) United States* -----	14.72	(26) Russia in Europe -----	9.81
(20) Italy -----	14.42	(27) Algeria -----	9.52
(21) Serbia -----	13.53	(28) Russia in Asia -----	9.36
(22) Spain -----	12.94	(29) Uruguay -----	8.33
(23) India -----	11.44	(30) Tunis -----	4.46
(24) Australia -----	11.30		

* It is interesting to note what a very poor yield per acre America also shows. It is the same with potatoes. Evidently the farmer element in the U. S. A. has yet to learn how it pays to cultivate and manure the crop adequately and wisely.

So much for science, and now in conclusion a word as to labor, and in these remarks I would perhaps address myself more particularly to my fellow-Britishers and say: You should arrange with the Mother-Country to train a larger proportion of her children as agriculturists, including dry-farming methods. In England our educationists seem to forget that an agriculturist, like a doctor or engineer, is welcomed everywhere, and for this reason, that, whilst a handy agriculturist is equally able to earn his living in town or country, a townsman is no use in the country. I say this because, whilst they leave no stone unturned to keep us well, or cure us if we fall ill, they are altogether out-of-date as regards training us up to earn our living; they will only teach us townsmen's work, and so force us to become consumers and not producers, whilst the world needs producers rather than consumers.

So much for the children, now for the grown-ups. Long ago, my friend, Mr. Reginald Enoch, who has written many books on many lands, urged the Home Government and local authorities to secure parcels of lands abroad to which their people could go, and so have "friends from home" to work with, whilst others would train them to become farmers. Remembering this, I published the following appeal in the August issue of my paper (Tropical Life of London) and sent copies to some 300 leading men in all parts of the world. I did so as wars are common to all people, and those yet to come will prove as murderous, and probably still more wasteful of life and limb than the one now being waged. All nations, therefore, may be interested in what I said and when their day of trouble comes they can do for their men and those dependent on them what I now urge my government to do with ours, both in England and her Dominions overseas, viz:

Back to the Land in India and Elsewhere—Ex-Soldiers as Agriculturists.

It is significant of the times that in the House of Lords, on July 22nd, Lord Sydenham asked whether the Government of India were preparing a scheme for giving grants of land after the war to officers and men of the Indian Army who had distinguished themselves in the field, and whether Government posts would be made available for those who were not agriculturists.

Lord Islington, after paying a well-deserved tribute to the valor of the Indian troops, replied that the Government of India had already approached the local authorities with a view to ascertaining what land was available, but there were many intricate and difficult questions to be considered before any decision could be arrived at.

Whether these intricate and difficult questions may cause so excellent a scheme to be abandoned I cannot say, but sincerely hope that such will not be the case. (Far from being abandoned, active steps are now being taken to enable the scheme to be effected). Meanwhile the whole matter touched upon by Lord Sydenham, namely, the placing of ex-warriors on the land, must not, in any case be lost sight of, whether the men be Indian or British-born subjects, both for the sake of the men as well as of those who are dependent on them for a living. In Russia the Tsar and Tsarina, we are told, are establishing agricultural settlements where the orphans and other victims of the war will be trained to earn a good living under healthy and happy conditions. This excellent example can well be followed by this Empire.

With the serious reduction in the output of food-stuffs, with which we are faced in-all parts of the world, and the need that there will be to feed and find employment for thousands of men with the wives and children, what better work could be found for a large number of them than that of an agriculturist, first to feed themselves, and then, as their output increases, to help feed others; the sale of their produce and the purchase of their supplies for the farm and home to be organized on a co-operative basis. Municipal and local bodies can help by securing land here or in the CoColonies (as Mr. Reginald Enoch has long urged shall be done) to send their own townfolk to, if work cannot be found for them at home.

Above all, let us remember what a benefit agricultural pursuits could and should prove if run on such lines as those adopted by the United States Bureau of Plant Industry when it established boys' corn clubs and girls' canning clubs to teach the members what was best to grow and how to cultivate the crop chosen. Quoting the Bulletin of the Pan-American Union for July, and the little work by Mr. W. W. Tracy of the Bureau of Plant Industry on "Tomato Culture," I can report that the first girls' canning club was organized in 1910, and by 1914, in the fifteen Southern States, known as the "Cotton Belt," the total enrollment numbered 33,173 girls of whom 7,793 put up 6,091,237 lbs of vegetables, mostly tomatoes, all grown on the small, one-tenth-acre gardens allotted to each girl and which she cultivated. The estimated value of this up-put was placed at \$284,880 against the cost to the girls of about \$85,000 only, thus giving a magnificent but well-earned and thoroughly deserved profit of practically \$200,000, or \$25 each. If two or three hundred such returns could be registered throughout the British Empire and America, think what an advantage it would be both to the producers and consumers alike, as the activities of the girls were not exhausted on earning this \$25, for they did the routine orchard and farm work as usual; this was a little by-play and there is no doubt that the larger the number of members (boys and girls) and the greater the output, the cheaper will be the cost and the larger the profits, whilst the risks are so spread out, that even a total loss through frost or hurricanes need not ruin the producers. Replying to the address of welcome offered to him after his victorious campaign in German South West Africa, General Botha referred in a prominent manner to the part that women had played in the campaign, especially in maintaining the farms whilst their men folk were at the front. So they have done and are doing over here,

in the offices and in the factories, to keep the homes going and the Empire's needs supplied. If they can do this whilst a trying campaign is on, how much better could they help when the campaign is over, if put in the way of doing so. Hard as it will be for many men to come back halt, maimed, and blind, their lot can be greatly ameliorated by being engaged in a form of work in which they and their women folk can both discuss plans with the men—their men—and so help each other by their companionship and advice when difficulties have to be overcome. Also, I take it, that such men will always be able to command the ear of their more fortunate and experienced fellowmen, and so, even in the worst cases of disablement, thus prove a source of comfort and help to their dependents, through their very helplessness causing others to be willing to help them. To do this, however, large numbers must go back to the land, as the towns will not be able to offer them a living, and it is, therefore, only right that the Imperial Government and also the local bodies should start discussing among themselves where these good and useful servants can go and how they can most satisfactorily and inexpensively be placed there, with the necessary implements, seed, live stock, and, above all, the house to live in, so as to make a start first to feed themselves and then later on to repay the advances that they have received.

Judging from what one sees of some of the hospitals, especially those with playgrounds attached (as is the case in front of the building in which I am writing these notes), the men, although wounded, could at least help with chickens, rabbits, and other live stock, and even do a little vegetable raising, whereby they and those who are too ill to come out would immediately benefit by having such healthy and nourishing food brought in "fresh from the farm." Meanwhile, experience would be gained when, if necessary, later on, the men are put on a homestead or plot of land of their own. As matters now stand the convalescent (wounded) soldiers seem to have nothing to do to kill time and the land is wasted, whilst we are all being told to eat less and produce more. I feel that there is a screw loose somewhere in this department that could with a little organization, very easily and advantageously be tightened up.

PRESIDENT JARDINE:

The secretary will next read an address by Dr. W. E. Taylor, of Moline, Illinois, on the subject of "Implements and Their Relation to Tillage." Dr. Taylor has long been actively engaged in agricultural educational work. He is now director of the Soil-Culture Department of Deere & Company:

Implements and their Relation to Tillage

In discussing this subject we will deal only with the Plow, Subsoil Plow and Disc Harrow.

The plow is recognized as the most important implement used on the farm, but too often it is misused. Probably the most important and least understood question is, "Is deep plowing advisable?" We will answer this question, "Yes," and "No."

The depth to till, or rather to plow or use the subsoiler, depends entirely upon the character of the soil and subsoil, the length of time the land has been cultivated and the depth of the soil. To recklessly advocate deep plowing is nothing less than criminal. The farmer should understand the value of humus, the phenomena of plant life and nature's process of supplying plant roots with water, before he ventures too far. To universally advocate deep plowing would be as inconsistent as advocating the growing of cotton or rice in the northern states.

In order to make this proposition plain; first, we will note the chemical requirements of the plant; second, we will consider the kind of soil which will permit of deep tillage; third, we will consider the benefits of deep tillage in soils where conditions are admissible; and fourth, we will describe the type of implements adapted to successful deep tillage.

In discussing this subject we will endeavor to point out the danger of abruptly plowing deep with the ordinary plow, also explain how a deep seed bed can be made with perfect safety by using an implement especially designed for that purpose regardless of the depth of previous plowing.

Humus, or organic matter, is absolutely essential to plant life. Humus is decayed vegetable and animal matter. It is found in the top layer of soil and varies in depth from an inch to several feet. Humus in virgin soil is formed from the natural growth and the decay of vegetation during the past ages. In cultivated soils it is maintained and can be increased by the application of barnyard manures and by plowing under green crops or any vegetable growth.

It must also be remembered that cropping lessens the amount of humus in soil, and by continued use, that which is not consumed by being made into plant food compounds, in a measure, becomes inactive.

The following table given by Snyder shows the influence of different systems of farming upon the humus content and other properties of the soil:

"Number One" below: Soil cultivated 35 years; rotation of crops and manure; high state of productiveness.

"Number Two" following: Originally the same as No. 1; continuous grain cropping for 35 years; low state of productiveness.

	No. 1.	No. 2.
Weight per cubic foot, lbs -----	70.00	72.00
Humus, percent -----	3.32	1.80
Nitrogen, percent -----	.30	.16
Phosphoric acid combined with humus, percent ----	.04	.01
Water-holding capacity, percent -----	48.00	39.00

It will be seen from the foregoing that as the humus content decreased the weight of the soil increased, and that with the decrease

in humus there was a corresponding decrease in nitrogen and phosphoric acid. The decrease in the water-holding capacity of the soil is also marked, indicating the necessity of maintaining an abundance of live humus in the seed bed.

Humus, or organic matter, is the main immediate source of nitrogen in the soil. Nitrogen-fixing soil bacteria, which have the power to gather nitrogen from the air, require organic matter in some form. Productive soil contains countless millions of living forms which may be properly called soil laboratory workers. These living organisms flourish on the organic matter, forming and transforming both organic and inorganic elements into plant food compounds. Upon the number and activity of these organisms depends the amount of available fertility. If humus, or organic matter, is absent or deficient, a corresponding deficiency is reflected in the crop. The availability of other elements such as potash and phosphorets also depends upon the nature and amount of the humus in the soil. Again, humus increases the absorbing and retaining qualities of the moisture in the soil. Humus also, in a measure, regulates the temperature of the soil, besides it improves the physical condition of the soil to a marked degree.

Recognizing the fact that the seed bed is the home of the plant, and that from the seed bed the plant receives its food, it stands to reason that it must contain humus in abundance if the plant is supplied with food, hence in plowing, great care should be exercised in gauging the depth, for we know that the subsoil is deficient in humus and that if it is brought to the surface in great quantities, the fertility of the seed bed is materially diluted or weakened, therefore, in our efforts to secure a greater feeding area for the plant roots by plowing deep, we are sure to do harm unless the depth is increased gradually and with each slice of new soil brought to the surface, organic matter, preferably barnyard manure, is thoroughly mixed with it. This, however, can be prevented by using the right type of plow which will be referred to later. By gradually increasing the seed bed one-half inch each year and keeping in mind the absolute necessity of supplying humus in sufficient quantities for the new soil and to maintain the required content of the old soil, the farmer can, with no danger of impairing his crop, in a few years attain a depth of ten, twelve or even fourteen inches.

When Not to Till Deep—If the subsoil is sand or gravel it is not advisable to bring it to the surface nor plow too near that formation. Sand or gravel will not retain water in suspension, hence, in such soils it is better to form, as far as possible, a compact plow sole which will, in a measure, prevent the percolation of rainfall, but retain it in the seed bed.

Sandy Soils:—In sandy soils deep plowing is admissible if an abundance of humus or organic matter is provided, otherwise the water will percolate below the reach of the roots, carrying with it fertility. The deeper a sandy soil can be cultivated, providing an abundance of organic matter is furnished, the more certain is the soil to maintain a sufficient amount of water to mature the plant.

Virgin Soils:—Virgin soils should not be plowed below the line of humus. However, subsequent plowing can be increased in depth the

same as in older cultivated lands, providing organic matter is supplied.

Benefits of Deep Tillage:—The benefits of deep tillage are many, providing all of the requirements heretofore mentioned have been complied with. It is obvious that the plant roots require room. Soil bacteria, which perform the function of converting elements into compounds, require air. Plants require food most of which is secured from the seed bed, and plants require water; hence to meet all of these requirements, the seed bed should be deep, of good tilth and in a good sanitary condition.

Roots Require Room:—Plant roots require room. The initial resistance of the plant being fragile, they naturally seek the course of least resistance. If the seed bed is shallow, they remain near the surface where they are apt to suffer for moisture in case of drouth, but if the seed bed is deep and mellow, they take their natural course which is downward and when they reach the bottom of the furrow, they have strength and stability to penetrate the more compact subsoils where they secure moisture, and in some instances plant food.

Air:—Soil bacteria being aerobic, or in other words, oxygen consuming organisms, the seed bed should be well aerated, a condition which can be attained by deep and thorough tillage. In some instances drain tile are necessary to facilitate the circulation of atmospheric oxygen through the soil, but if the water-line is not too near the surface, deep plowing serves the purpose.

Plant Food:—A deep seed bed well stocked with organic matter, necessarily will maintain more of the soil organisms than a shallow one. The greater the number of bacteria and the more active they are, the more nitrogen will exist and the more inorganic plant food elements will be made soluble.

Water:—The amount of available moisture depends to a great extent upon the depth and tilth of the seed bed. If the seed bed is shallow, primarily it does not absorb great quantities of water and in case of drouth, it dries out readily. If it is deep, mellow and spongy, it acts as a surface reservoir to absorb and retain heavy downpours of rain until the surplus can percolate into the storehouse below. If the seed bed is shallow, the soil is liable to wash away during heavy rains.

"Mr. Daniel Lackey, whose farm is located near Oklahoma City, plowed about forty acres twelve inches deep last winter just after the frost was out of the ground. This spring the ground was planted to corn. He secured forty-five bushels per acre and his neighbors who did not plow deep, secured practically nothing."

The above indicates that a deep, well-made seed bed is a reasonably safe insurance against a protracted drouth, for we are aware that the section mentioned was extremely dry during the entire season.

We are firmly convinced, and that conviction is based upon many demonstrations, that if the dry land farmer will plow deep during the fall, and the subsequent rains and snows are at all adequate, he will be reasonably certain to secure a fair crop, providing his soil is adapted to dry land operations. It must be remembered that a thin soil with a gravelly or sandy subsoil is not suitable for dry land farming.

When to Plow Deep:—In some sections of our country where the soil is rich in humus, which is indicated by its black color, it is safe, after the first plowing, to till deep and, as a rule, the production will be in keeping with the depth the ground is tilled. The arguments, based upon experience in favor of deep tillage when the laws governing plant growth and plant food chemistry are not violated, are so apparent that farmers cannot afford to ignore the benefits to be derived from making a thorough investigation of all conditions heretofore mentioned and govern themselves accordingly.

Deep Plowing Without Bringing Subsoil to the Surface:—The danger of bringing subsoil to the surface can be prevented and many of the benefits of deep plowing gained by using a plow which thoroughly pulverizes the bottom half of the furrow slice, but does not place the subsoil on top of the surface soil.

This plow has a broad share and the moldboard is very narrow at the point where it joins the share, but widens gradually at the upper end. The share loosens and pulverizes the bottom slice which immediately falls to the bottom of the furrow through the space between the outer edge of the moldboard and the wing of the share. The broad part of the moldboard turns the top soil in the ordinary way.

While this plow penetrates to a depth of fourteen to sixteen inches, the furrow is left half-full of pulverized soil. A seed bed so made is necessarily thoroughly ventilated and an abundance of room is provided for plant roots. Also, owing to the loose condition of the soil, water is rapidly absorbed.

This plow is certainly an ideal implement to use. In fact, it is the only one which has ever been devised that eliminates dangers and at the same time provides a deep seed bed.

The Jointer:—When trash exists on the surface in such quantities that it is not thoroughly covered, the jointer should be used. This attachment can be gauged to any required depth to turn surface trash. As it is turned, it strikes the previous furrow a few inches below the top and is caught and covered by the moldboard slice, leaving the surface free of the accumulation and at the same time not placing it below the reach of the disc or other tillage implements.

Sod can be plowed deep with perfect safety if the jointer is used. It should be run to a depth of two or three inches, depending upon the nature of the sod. The sod-ribbon is so placed when it is turned that it is slightly covered by the dirt from the moldboard and can be easily pulverized by using a disc. Without the jointer attachment the sod strip might be covered too deep or project above the surface, depending entirely upon the texture of the soil.

The advantages in plowing sod deep, if this plow with the jointer attachment is used, is plain. Water is secured and stored more readily and roots can penetrate very deeply, by a condition which cannot be attained where the ordinary procedure is followed.

It must be remembered, however, that to plow sod deep with the ordinary plow, turning the sod, as is usually the case, to the bottom of

the furrow and bringing to the surface raw unventilated soil devoid of humus, is disastrous.

Sub-soil:—Unfortunately, conditions exist where deep plowing cannot be accomplished until the physical condition of the soil has been changed. Some soils below the depth of the ordinary plow are so dense and sticky that penetration is difficult and scouring impossible. In other soils, a hard pan may exist which is not only difficult to penetrate, but if turned or materially loosened, large air spaces are formed which hinder the upward movement of capillary water. Either condition can be overcome by using the right type of subsoil plow.

The benefits of subsoiling are often misunderstood, and in many instances, the farmer has been misled. The first type of subsoil plow invented had a narrow share and a long moldboard, intended to bring subsoil to the surface. Theorists at that time believed that subsoil, being new, was rich in plant food elements and would make their land productive. The absence, however, of humus in the bottom soil resulted in disappointments. If the subsoil was only clay or sand, there would be no production until organic matter was thoroughly mixed with the soil and reduced to humus.

The next type of subsoil plow devised was one with a duck-bill shaped point, intended to break up the soil below the bottom of the furrow. This implement was condemned, especially where the subsoil was hard and composed largely of clay, for the reason that the breaking-up process caused large air spaces which practically stopped capillary water from rising to the seed bed.

The modern type of subsoil plow possesses none of the objectionable features of the other two mentioned, but it does solve the difficulties which were first mentioned, namely, dense, sticky subsoils and hardpan.

This plow is built on the principle of a colter. It cuts a gash from three-eighths to one-half inch in width and to any required depth, but it does not break up the subsoil or hardpan to any great extent. In this gash water and air are freely admitted. They naturally spread out when the bottom of the gash is reached and, obeying nature's laws, they go to the surface by capillary attraction.

To illustrate, if a wooden floor is laid upon another floor which is tight and water is poured into a crack in the top layer, it naturally spreads out and in time comes to the surface through the process of capillary attraction, causing a rotting of the boards. Likewise, water which enters this gash in the soil followed by air, works on the same principle, coming to the surface as it must, it causes a mellowing or rotting of the compact soils.

Two important things have been secured:

First, water is stored to be utilized by the plant and the dense soil is mellowed, permitting the penetration of roots.

Second, after this plow has been used and the water and air have done their work, the deep plow will then not only penetrate but will usually scour.

Where this plow has been used, especially in dry sections, the

results have been remarkable. The implement can be attached to a gang plow, penetrating every alternate furrow, or it can be easily drawn by two horses, running to a depth of from ten to eighteen inches.

Unless the soil is extremely compact, it is hardly necessary to use the subsoiler except in every alternate furrow, nor is it required oftener than once in four or five years.

As a rule, the best results are not obtained the first year, for the reason that very compact soils and hardpan become mellow through the action of air and water quite slowly.

The Disc Harrow:—Next in importance to the plow is the disc harrow. While it is useful in humid sections, it is indispensable to the dry land farmer. The disc harrow should be used before the land is plowed. You may ask the question, "Why?"

Water stored in the deeper subsoils reaches the plant roots by capillary attraction, or in other words the process of moisture passing from one particle of soil to another until it reaches the surface where it escapes by evaporation if not prevented by a dust mulch or taken up by plant roots.

Capillary attraction takes place only where the soil particles are in close proximity, or in other words, touch each other. If from any cause large air spaces exist, there can be no upward movement of the moisture above the air spaces. If the ground is thoroughly disced before it is plowed, two things are accomplished; namely, surface lumps are pulverized, and trash such as weeds, corn stalks or stubble, is cut up and worked into the ground.

If the discing is thorough, the contact between the bottom of the furrow and the slice turned by the plow will be compact, or in other words, there will be no large air spaces to hinder the upward movement of water. This can be nicely illustrated by placing two rough lumps of sugar together and touching the bottom lump to colored water. When the water passes through the first lump it will stop, owing to the break between the two lumps, but if they are ground together so that the contact is compact, then the movement will be continuous.

We know that the available plant food is in the seed bed, or in other words in that portion of the soil which is aerated and cultivated. If in the event of a drouth, as too often happens in semi-arid regions and not uncommon to humid sections, the capillary water will stop when it reaches the break or trash at the bottom of the furrow, the seed bed will dry out and the plant will perish. We have seen many fields of grain which would have made a splendid crop but because of the trash at the bottom of the furrow, capillary water was hindered causing the seed bed to dry and as a result the crop died or was deficient.

In one instance forty acres were disced thoroughly, plowed deep and subsequently disced and sowed to wheat. An adjoining field of the same kind of soil was not disced, but plowed and the grain sown at the same time as the other field. The first piece made a yield of $32\frac{1}{2}$ bushels of wheat per acre and the other field but 9 bushels.

If the discing is done as soon as the grain has been cut, the mulch

formed will, in a great measure, prevent the escape of moisture during the interval between the time the grain is cut and the fall plowing, hence in dry sections the disc harrow serves a double purpose.

Again, after a field of grain has been cut, the escape of moisture is greatly increased and the growth of weeds encouraged. The disc harrow, as previously stated, will not only prevent the escape of moisture, but serves to destroy the weeds which otherwise would go to seed.

The Disc Renders Food Accessible to Plant Roots:—Plant food elements are made into compounds by the action of water, air, bacteria and other elements. After being rendered soluble, the mass forms a film around each particle of soil and is ready for use. Plant food thus formed is carried into the plant by delicate root filaments, having been taken up by a process called *cosmosis*.

If hard lumps exist, the delicate food gathering roots are unable to penetrate them, hence only the plant food adhering to the particles of soil on the surface of the lump is accessible and that adhering to the particles which make up the internal mass of the lump is not used.

When we consider that the particles of soil are so minute that more than one thousand of them laid side by side are required to make an inch, it is very evident that the feeding area of a lump is increased more than a thousand fold by being thoroughly pulverized.

It will require no other argument than one trial to convince the farmer that a thorough pulverization of even forty acres, if the ground is at all inclined to be lumpy, that his crop will be increased more than enough to pay for the harrow. This statement is not based upon a theory, but upon actual work done in the field, not once but several times.

Discing Manure:—Barnyard manure is applied either before or after plowing. In either case it should be disced in. If spread before the ground is plowed, it will, unless disced into the ground, be turned to the bottom of the furrow forming air spaces which prevent the upward movement of water, in the same manner that lumps and other trash heretofore mentioned does. If the manure is applied after the ground is plowed and subsequently disced, both the organic portion and the plant food are placed within reach of the first young roots at a time when they need nourishment the most.

In a number of trials where manure was plowed under in one field without discing, and in another adjoining field, it was applied as a top dressing after the ground was plowed and subsequently disced, the increase of corn in the disced field was twenty-two per cent more than in the other field. Well-rotted manure gives better results as a top dressing than coarse fresh manure. When coarse fresh manure was applied before the ground was plowed and thoroughly disced, an increase of sixteen per cent was made over the field where the manure was plowed under without discing. In any event, the manure should be applied evenly with a spreader, otherwise it is apt to be left in bunches.

As a Packer:—The disc harrow serves as a splendid packer. The blades should be set straight and lapped a little more than half unless a double disc is used. Cross discing further insures more perfect pul-

verization and compactness. The disc packs the earth on the same principle that a spade packs dirt around a post that is being set or under a railroad tie.

Many other implements are equally as effective as the disc if they are sufficiently weighted to compact the soil throughout the entire seed bed. The farmer should keep in mind the fact that compactness is essential, both to promote capillary attraction and rapid root development.

If, after the seed is planted on thoroughly disced ground, a corrugated roller is used, the soil will be packed to a greater depth than it can be with the same implement on lumpy ground. The roller should always be run at right angles to the prevailing wind, for the reason that the little ridges, in a measure, prevent soil from blowing.

Discing Meadows and Pastures:—Meadows and pastures are always benefitted by being disced. If the farmer does not have an alfalfa cultivator, the disc harrow answers the purpose.

Alfalfa should be disced after the first cutting, and in some instances in the spring before the first growth if the ground is hard and at all inclined to be weedy. The disc splits the crowns, thereby thickening the stand, forms a mulch which prevents the escape of moisture and destroys any weeds that may exist. Old meadows and pastures become soil and root bound. The disc loosens the ground rendering it more porous and generally stimulates the growth every materially.

If manure is spread on a meadow or pasture during the fall and subsequently disced, the growth will be markedly increased the following spring. In one instance a thin coat of well rotted manure was applied to a field of timothy. The ground was immediately double-disced and the following year the crop on the treated portion of the field was double that on the piece not manured and disced.

PRESIDENT JARDINE:

We still have a few more minutes if any one wishes to use them. If not we will entertain a motion for adjournment.

MR. McCAFFREE:

I make a motion for adjournment.

PRESIDENT JARDINE:

It has been moved that we bring the sessions of the Congress to a close. Is there a second to that motion?

Seconded.

PRESIDENT JARDINE:

It has been moved and seconded that the Congress stand adjourned

and all in favor of this will make it manifest by saying "Aye." Opposed "No." The "Ayes" rule and the Eleventh International Dry-Farming Congress now stands adjourned.

Appendix

Precipitation Has Not Increased

By W. I. Drummond.

The theory that climate is changed and precipitation increased by the settlement of a country, the breaking up the sod, cultivation of fields, planting of trees, the retention of water in lakes, ponds and irrigation ditches, would appear to be well founded. Unquestionably vastly more rainfall is caught and retained in the soil and otherwise in a settled and cultivated region than in the same region prior to settlement and cultivation. This is especially true of a prairie country. A greater portion of this water must return to vapor form through evaporation and the transpiration of growing vegetation, and a lesser part return to the sea immediately and directly through streams, than was the case when the country was in its virgin state. And since rainfall can only occur through the condensation of water vapor, it would seem that this added vapor should, by re-condensation, add to the annual precipitation.

But, like many other apparently reasonable theories, this one does not work out in practice.

Notwithstanding the occasional publication of partial proof to the contrary, this theory is quite well grounded in the minds of a great many people. It has been used as an inducement for the settlement of new sections in the semi-arid belt. Real estate men have not neglected this asset to their advertising folders, and numerous claims have been made, usually accompanied by figures either false or not representative, that certain regions have actually experienced a marked increase in rainfall through settlement and cultivation. In addition, assertions are frequently made that the winds have lessened, and the climate generally undergone a change.

These beliefs and theories have found lodgment in many of the most learned modern minds. No less a student than James Bryce, ex-ambassador from Great Britain to the United States, has been quoted as expressing the belief that the climate of Oklahoma had already undergone considerable change, and would undergo much more, as a result of settlement and cultivation, and the building of ponds.

It does not require record evidence to prove that wet and dry years occur in series or cycles, irregular though they are. But when it comes to determining with any degree of accuracy what the permanent changes in climate or precipitation, if any, have been, it is necessary to consult reliable records.

As far as the United States is concerned, the only climatological records covering a long period of years, and at the same time a great number of representative localities, are those of the weather bureau of

the Department of Agriculture. For the purposes of this article, and as bearing particularly upon the subject in question, the only records necessary to consult are those of stations between the Mississippi river and the Rocky Mountains. It will be conceded that if there is anything whatever in the theory of increased precipitation, it would show here. There are several hundreds of these stations, the records of which run back for twenty to seventy-five years. Some of them are fragmentary, but there are enough of them complete upon which to base a conclusive opinion, and arrive at the actual facts.

In order to do this, I have with great care assembled the records of eighteen representative stations, in seven states, reducing them to annual averages for periods of ten years each, and applying the same periods to all the stations. These condensed records, shown in the table herewith, disclose a remarkable uniformity throughout. There is very little difference between any two periods in the figures for any station. The figures for each period, for each station, embrace seasons of excessive precipitation, and seasons of drouth, but the average is not seriously disturbed.

Rainfall records of eighteen representative stations between the Mississippi River and the Rocky Mountains, showing the average annual precipitation in ten-year periods:

Station	1841 to 1850	1851 to 1860	1861 to 1870	1871 to 1880	1881 to 1890	1891 to 1900	1901 to 1910	1911 to 1914
Denver, Colorado -----	-----	-----	-----	14.88	13.89	14.31	14.51	16.16
Las Animas, Col. -----	-----	-----	11.66	11.42	12.02	11.00	13.33	15.26
Fort Reno, Okla. -----	-----	-----	-----	-----	29.70	27.70	33.46	22.48
Fort Sill, Okla. -----	-----	-----	-----	30.03	30.40	30.85	32.77	23.42
Independence, Kans. -----	-----	-----	-----	38.91	39.50	35.75	40.04	35.28
Manhattan, Kansas -----	-----	-----	28.38	33.08	30.02	29.61	36.19	26.15
Fort Scott, Kansas -----	42.76	-----	-----	-----	-----	41.21	41.48	40.75
Wallace, Kansas -----	-----	-----	-----	17.64	16.44	14.49	17.28	11.11
Hays, Kansas -----	-----	-----	-----	25.42	21.67	22.34	24.95	19.27
Leavenworth, Kans. -----	39.39	34.55	31.92	39.42	37.21	36.23	35.50	32.53
Oregon, Mo. -----	-----	37.64	37.80	34.61	34.66	36.82	38.29	28.38
Miami, Mo. -----	-----	30.98	33.57	33.92	43.09	37.42	41.64	-----
St. Louis, Mo. -----	45.34	45.27	40.82	37.32	39.85	36.12	36.23	40.41
Austin, Texas -----	-----	29.38	33.73	33.88	35.20	33.38	28.69	33.82
Menardville, Texas -----	-----	22.00	-----	23.03	-----	21.85	22.09	-----
Santa Fe, New Mexico --	-----	22.32	13.96	13.98	14.90	15.05	13.74	14.92
Dodge City, Kans. -----	-----	-----	-----	17.88	21.81	21.71	19.33	19.06
Fairbury, Nebraska -----	-----	-----	-----	30.04	29.54	27.35	32.14	-----

The records of three of these stations run back seventy-four years. The figures for the last complete ten-year period are slightly less than for the first.

Six stations have records covering six complete periods, or sixty years. The combined average for the last three of these periods, is .38 of an inch greater than that of the first three periods—an inconsiderable difference—but the last period shows a less average than the first, by 1.01 inches.

Fifteen stations have complete records for forty years, or four periods. The average precipitation for the first twenty years was substantially the same as the last twenty; to be exact, it was .255 of an inch more.

Not only does the general or combined average fail to show any

substantial increase or decrease, but no single station can be selected which does show such change.

The Conclusion.

The accuracy of the weather department's figures will probably not be questioned. They are complete, with the exception that a few interpolations from near-by points have been made, where exact figures for a month at a station were missing. But these instances are few, and cannot inject appreciable error into the calculations. It may be taken, therefore, that the settlement and cultivation of the great plains region has so far not affected the precipitation either way. The Great American Desert clearly had substantially the same average rainfall and climate when it was named as it has now.

But the facts should not be discouraging. It is more to the credit of the settlers of the western plains and conquerors of the desert that they accomplished their task without climate and conditions being changed than otherwise. What better proof could be desired that Nature's forbidding aspect need not always deter man, or that man can conquer without Nature readjusting her habits to suit his limitations? And yet this is a line of thought which is liable to lead the too sanguine into fatal error, for there is a limit beyond which man may not dare go with hope of success. Many have done so, and have failed.

Though the seasons have not changed permanently, men have by experience and study learned how to successfully farm under climatic conditions which a few decades ago would have been, and were, impossible with the methods then in use. The system of agriculture advocated by the Dry-Farming Congress is more responsible for this than anything else.

Climates vary, but never change permanently.

Commercial Varieties of Alfalfa

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It is only within the last twenty years that varieties of alfalfa have been recognized commercially in the United States, and only within the last ten years have they been given really serious attention. Prior to 1898 no commercial distinction was made between the various lots of alfalfa seed sown in this country, whether they were of foreign or domestic origin. Coincident with the introduction of alfalfa into the various sections of the United States there developed an interest in varieties or strains for special conditions. This interest has resulted in the recognition and adoption of at least nine fairly distinct commercial varieties and strains. These varieties and strains show a great diversity in their adaptations to climatic conditions, some giving the best results in the cold North and Northwest, while others succeed only in the extreme South and Southwest, where the winter temperatures are very mild.

These alfalfas have been produced for the most part in nature with almost no intentional effort on the part of man. The hybrid varieties are natural crosses, and the distinct types of pure origin are the products of natural selection. However, it is hoped that the results of the systematic plant breeding that has been conducted by the Department of Agriculture and the State agricultural experiment stations during the past decade will soon be available to the general public and that these efforts will produce strains or varieties of alfalfa that will be superior even to the best commercial ones that are now available. The present need is perhaps the greatest for alfalfas that will give profitable yields under the extreme conditions of moisture that exist, broadly speaking, in the West and in the East; that is, for the humid sections and for the semi-arid sections, since in these sections the effort to extend the culture of alfalfa is the most active. While improved methods of culture will doubtless be an important factor in the ultimate success which alfalfa may attain in the semi-arid and humid regions, nevertheless there is still much to be expected from better adapted varieties or strains.

The commercial alfalfas of this country may be divided into five somewhat distinct groups, each containing strains or varieties that vary considerably within themselves. These groups may be described briefly as follows:

The common group includes the ordinary purple-flowered, smooth alfalfa, of which there are numerous regional strains generally grown throughout the western part of the United States.

The Turkestan group includes alfalfas that have been developed in Turkestan. They differ from the common alfalfas of this country in that they are somewhat shorter and more spreading in habit of growth and are slightly more hairy. No commercial distinction is made between the various strains from Turkestan, all of them being sold under the name "Turkestan."

The variegated group includes the alfalfas that have originated from a cross between common alfalfa and the yellow-flowered species. The Grimm, Baltic, Canadian variegated, and sand lucern are the best known examples of this group.

The nonhardy group includes rather distinct varieties that are very susceptible to low temperatures. They are, in general, very erect in habit of growth, recover quickly after cutting, and have a long growing period. The Peruvian and Arabian varieties are members of this group.

The yellow-flowered group includes the various forms of the yellow-flowered species. They are easily distinguished from members of the other groups by their yellow flowers and crescent or sickle-shaped pods.

The Common Alfalfa Group.

Comparatively little is known with regard to the origin of common cultivated alfalfa, although there is good reason to believe that it developed in western Asia and was one of the first plants to be cultivated solely for forage. Since alfalfa naturally is an open-fertilized plant, it is difficult to determine just how many strains are included in what we now call the common variety.

The alfalfa seed that was first sown in this country was introduced from various parts of Europe, but the stock from which most of the common alfalfa of our Western States has been produced was brought to Chile from Spain, and after having been grown there for many years was introduced into California about 1850. For lack of a better term it has been designated as "common alfalfa," or, to be more specific, the term "common alfalfa" has been used to include all of the alfalfas that are not clearly of hybrid origin or that do not have fairly distinct and uniform varietal characteristics, even though within this group what are known as regional strains are coming to be recognized.

In most lots of common alfalfa there occur some plants that grow more quickly than others after being cut. These plants also have a tendency to produce somewhat heavier yields and differ from the others in general habit of growth. They are more erect and have comparatively small crowns, which are produced well above the surface of the ground. In contrast to these there are plants that are slightly procumbent in habit of growth and have comparatively broad crowns, which are produced somewhat below the surface of the ground. The plants of the first type are favored by mild climatic conditions, but succumb readily to severe winter conditions. This type of plant is sometimes referred to for convenience as the southern or nonhardy type. Plants of the second type are hardy and predominate as a result of the elimination

of the more tender individuals in strains that have been developed in cold climates. This particular type is often referred to as the northern or hardy type. These two types of plants furnish a basis for the development of regional strains, which, as they are at present defined, are produced when common alfalfa is grown for several seed generations in definite localities where eliminating conditions of one kind or another normally prevail.

To illustrate what is meant by "seed generation," the seed produced from the original seeding may be said to be the first seed generation. If this be sown and seed produced from it, such seed would represent the second seed generation, and if this practice be continued for a considerable number of generations under eliminating conditions it will have a tendency to produce a fairly distinct strain of alfalfa.

It is not possible to formulate an entirely satisfactory definition for common alfalfa, since there is no sharp distinction between regional strains and distinct varieties. For example, certain well-recognized commercial varieties are probably nothing more than regional strains developed to a greater degree. The names of the regions in which these varieties have been developed are frequently applied to them as varietal designations, but they are commonly referred to as true varieties and not as regional strains. The Turkestan variety may be cited as an example of what is meant in this connection. A difference is now being recognized between lots of alfalfa that have been grown for several seed the prevailing price for ordinary seed is asked, inasmuch as the history generations in the various States, and to such lots names of the States or terms descriptive of the conditions under which they were produced are sometimes applied; as, for example, Kansas-grown alfalfa, Montana-grown alfalfa, irrigated alfalfa, dry land alfalfa, and many others. Certain regional strains produced in foreign countries are also recognized.

Domestic Strains.

The names "Kansas-grown" or "Montana-grown" as used in the general seed trade are not necessarily distinctive. The mere fact that a certain lot of alfalfa seed was produced in Kansas or Montana is of no importance unless such lots of seed were produced as a result of several seed generations grown in these States. The same is true of seed indicated in the trade as "dry-land," "irrigated," and "nonirrigated" alfalfa, and it is safe to say that much undue discrimination has resulted in connection with their sale. Just how many seed generations are required before a variety growing in one locality assumes rather definite characteristics doubtless varies with the nature of the eliminating climatic conditions and can not be estimated definitely. Fortunately, much of the seed that is grown in sections that produce seed with a fair degree of consistency has come from stock that has been grown in these sections for several seed generations. However, it is always well for a prospective purchaser to investigate this point if possible. The history of seed indicated as "dry-land" or "nonirrigated" should be investigated very carefully before purchasing if a price materially above of such seed is often very uncertain.

The so-called regional strains produced in Kansas, Oklahoma, and other States having similar conditions, have a tendency to recover more quickly after cutting and to give better yields than strains produced farther north. This characteristic has apparently been the result of climatic conditions favoring the perpetuation of the more rapid growing and high yielding individuals until a strain is produced that has these characteristics to a rather definite degree. The regional strains from the above sources, therefore, are recommended in sections where the winter-killing of alfalfa normally is not a serious factor.

Ordinary alfalfa grown west of the Rocky Mountains is very similar in its characteristics to that grown in Kansas, Oklahoma, and Texas, and careful tests indicate it to give approximately the same results in sections having comparatively mild winters. Where winter-killing occurs with a degree of consistency, the strains of alfalfa developed in the Northern States are preferable to those produced further south. Regional strains from northern Nebraska, the Dakotas, and Montana are at least somewhat hardier than those developed in Kansas, Oklahoma, and Texas, or the inter-mountain region, owing, presumably, to the fact that the severe winters of the North have effected the elimination of a great many of the tender individual plants. These northern strains of common alfalfa are seemingly less productive in mild climates than those from the South, but their tendency toward greater hardiness makes their use advisable for seeding in the North.

It is reasonable to assume that where alfalfa is grown under conditions of scant moisture there is some elimination of the less drouth-resistant individuals and that if elimination continues throughout a large number of generations a strain superior in drought resistance must necessarily result, just as comparatively hardy strains have developed, for example, in the Dakotas and Montana. It must be admitted, however, that the tests conducted by the United States Department of Agriculture and the results of those published by State agricultural experiment stations have not revealed a materially superior drought resistance of dry-land-grown alfalfa over the common alfalfa grown either under irrigation or where rainfall is fairly abundant. The probable explanation is that the lots which were tested had not come from a sufficiently large number of generations a strain superior in drouth resistance must be. It is very doubtful whether much of the seed offered upon the market as "dry-land" or "nonirrigated" is in the least superior to that grown under irrigation or in the so-called rain belt.

Provence.

Provence is the name that is applied to a strain of alfalfa grown in southwestern France. According to the definition formulated at the beginning of this treatise, it is classed as a regional strain of common alfalfa and not as a distinct variety. While it was doubtless introduced into this country at an early date, there is no record of its introduction under the name of Provence until 1898, when the Department of Agriculture procured a small quantity of seed for testing. It was apparently

shortly after this date that the name was used commercially and the seed received limited recognition by the seed trade.

The Provence strain differs so slightly in general appearance from the common region strain from Kansas that one can scarcely be distinguished from the other. There are, however, a few differences of some importance. The Provence commences growth earlier in the spring and continues to grow later in the autumn in the southern part of the United States than does the strain from Kansas. It also makes somewhat quicker growth after cutting. However, it is not quite as hardy and can not be recommended generally north of the central part of the United States.

While the true Provence strain is an excellent one for sections in which severe winters do not occur, it is not commercially important in this country. Very little seed of it is offered on our markets, and a considerable proportion of that offered as Provence is not true to name. On account of the uncertainty of securing reliable seed, purchasers are advised to buy American-grown seed in preference to it.

Spanish.

Within the past year, and doubtless largely as a result of the war in Europe, there have been imported into this country several thousand pounds of alfalfa seed from Spain. The Department of Agriculture has at various times tested numerous varieties and strains from that country and in general has found them to resemble the Provence alfalfa. It can not advise definitely with regard to the use of the commercial lots that are now being imported until sufficient time has elapsed to give them a thorough trial. It is safe, however, to recommend that the Spanish-grown alfalfa seed be not sown in any of the Northern States, since in all probability the plants resulting from it would not prove to be hardy.

Turkestan Group.

Ever since 1898, when the Department of Agriculture introduced several lots of alfalfa seed from Turkestan, all of the commercial seed coming from that country has been classed under the name "Turkestan alfalfa" regardless of its characteristics or history. The strains introduced by the department were selected from regions having low rainfall and rather extreme temperatures, where they had been grown for many seed generations. These early importations gave such promising results in the cold, dry portions of this country that a demand at once was created for seed from Turkestan. This demand resulted in the importation of miscellaneous lots of seed from all parts of Turkestan where seed could be obtained profitably. In recent years, however, most of the seed that has been imported has come from Russian Turkestan, where it was produced under irrigation. There is, therefore, considerable similarity between the various commercial lots of Turkestan alfalfa.

The alfalfas that have been received from Turkestan as compared

with the commercial strains grown in this country are usually characterized by a lower and somewhat more spreading growth, smaller and slightly more hairy leaves, and finer stems. But it is almost impossible even for a trained botanist to distinguish between individual plants of Turkestan alfalfa and those of the American-grown strains, so that confusion often occurs.

Generally speaking, commercial Turkestan alfalfa has proven to be inferior to the American-grown strains in nearly every case where comparative tests have been conducted. In the eastern half of the United States, where alfalfa seed is not produced in commercial quantities, imported seed was used almost exclusively until within the past few years. Of the several million pounds of alfalfa seed that have been imported annually, approximately 95% came from Turkestan. This fact is responsible for many of the failures that occurred with alfalfa in the Eastern States. In brief, the commercial Turkestan alfalfa yields less than the American-grown strains, is shorter lived, and is less hardy than the Grimm, Baltic, and Canadian variegated. It is, therefore, not a desirable variety.

Considerable quantities of alfalfa seed are still coming to this country directly from Turkestan, regardless of the war in Europe, so that farmers before making purchases should demand the assurance that the seed which is offered them is American-grown. Fortunately, commercial Turkestan alfalfa seed can be identified in most cases by the seed of Russian knapweed which it almost invariably contains. The seed of this weed is not found in commercial alfalfa seed from any other source. Being considerably larger than alfalfa seed, of an oblong shape, and of an ivory, whitish color, it can usually be distinguished with little difficulty.

Variegated Group.

Wherever the ordinary purple-flowered alfalfa and the yellow-flowered species are grown side by side a natural hybridization takes place, which results in crosses that show to a greater or less extent the characteristics of both parents. These crosses subsequently intercross among themselves and with the original parent stock, particularly the common alfalfa, thus producing a variety of forms which show considerable range in flower colors. The predominant color of the flowers is the same as of the ordinary alfalfa, but brown, green, greenish yellow, and smoky hues are not uncommon, and occasionally pure yellow flowers occur. It is because of this range in flower color that the name "variegated" has been assigned to the group.

The various members of this group are so similar that it is seldom possible to distinguish between them, but fortunately almost anyone can learn to distinguish a field of variegated alfalfa from one of common alfalfa with a considerable degree of certainty by observing the flower colors and the form of the seed pods. While the greater proportion of the flowers of the variegated alfalfas are the same as those of the com-

mon alfalfas, a close examination will reveal some plants having greenish or smoky flowers, and occasionally a pale or yellow one. Furthermore, the seed pods in a field of variegated alfalfa show considerable range in form. Some are circular, semicircular, or loosely coiled, but by far the greater portion of them resemble very closely the compactly coiled pods which alone occur in fields of common alfalfa. In the earlier stages of growth, however, there is no satisfactory way to distinguish between the variegated and the common groups.

As a rule, the alfalfas that belong to the variegated group are more resistant to cold and drought than the other commonly grown varieties or strains, undoubtedly due in a considerable degree to the presence in their ancestry of the yellow-flowered species. This yellow-flowered species is characterized by its hardiness and drought resistance and occurs naturally over a large portion of Europe and Asia that is too cold and dry for the ordinary purple-flowered alfalfas. It is quite probable that a great many lots of alfalfa that exhibit no marked tendency toward hardiness have some trace of the yellow-flowered alfalfa in their ancestry. Their lack of hardiness may be accounted for partly by the fact that the yellow-flowered species has exerted only a slight influence and partly by the fact that they were probably developed in mild climates. Variegation in the color of the flowers is not positive proof of a variety's hardiness, but it is at least a fair indication. Of the large number of strains of variegated alfalfa in question, the Grimm, Baltic, sand lucern, and Canadian variegated are the only ones that are commercially important. The Cossack and Cherno have been advertised quite extensively, but seed of neither is available in quantity. A few other variegated strains have also been advertised to some extent, but they are at this time of little consequence.

Grimm.

According to the account published by the Bureau of Plant Industry in Bulletin No. 209, Grimm alfalfa was introduced into Carver County, Minn., in 1857, by Wendelin Grimm, an immigrant from Baden, Germany. It is said that the original lot of seed, which did not exceed 15 or 20 pounds, was sowed in the spring of 1858. Accounts differ as to its hardiness and the success at first attained with it. However, a sufficient number of plants survived the rather severe winters to enable Mr. Grimm to save small quantities of seed from time to time for future sowings. The first considerable quantity was apparently produced in 1867, when 480 pounds were threshed from 3 acres and sold in Minneapolis for 50 cents a pound. During subsequent years Mr. Grimm's neighbors attempted to grow alfalfa from seed produced in other parts of the United States, but in practically every case the sowings were entirely winter-killed, while at least some of the Grimm plants came through in good condition. The real value of Grimm alfalfa was not generally recognized, however, until the attention of the Minnesota agricultural experiment station was called to it and efforts were made by that station to extend its culture. In 1905 the United States Department of Agriculture began to experiment with this variety, and since that time it has been grown in comparison with a large number of other

varieties and strains, and in practically every case has proved itself equal, if not superior, to any of these in hardiness.

To the casual observer, the Grimm alfalfa does not differ materially from the common strains, but a closer examination will reveal a greater diversity of forms, upright and recumbent individuals often occurring side by side. While a large percentage of the flowers are of the same color as those of common alfalfa, there are a few that are greenish, smoky, or blackish, and occasionally a plant is found with yellow flowers, indicating quite definitely that the strain is the result of a cross between the common and yellow-flowered species. The taproots show a tendency to branch and the crowns to be low set and spreading, characters which are undoubtedly of great importance in rendering a variety resistant to cold. In ability to produce seed Grimm alfalfa is about equal to most of the common strains.

The hardiness of Grimm alfalfa is probably due in part to the presence of the yellow-flowered alfalfa in its ancestry and in part to the process of natural selection which took place under the severe climatic conditions to which it was subjected for a long period of years in Minnesota. On account of its superior hardiness, the variety is particularly recommended for the northern part of the Great Plains region and all parts of the Northwest where little protection is afforded by the snow. It has also proved better able to survive the winters in the colder portions of the humid section of the country, where winter-killing is a serious factor. The greater cost of the Grimm seed and the inability of the variety to produce as large yields of hay in a mild climate as the common alfalfa will have a tendency to confine its culture to the more northern States where hardiness is essential to the success of the crop.

When Grimm alfalfa first began to demand attention, all of the seed was produced in Minnesota, but as conditions there are not favorable for seed production, stock was sent to Montana and other Western States in order that the available supply might be more rapidly increased. Carefully conducted tests of Grimm seed produced in Montana, Idaho, and the Dakotas indicate quite definitely that it has not decreased any in hardiness as a result of having been grown for one seed generation under these changed conditions. The supply of seed on the market is still, however, rather limited and commands a high price. As a result, unscrupulous dealers have offered for sale large quantities of common alfalfa under the name of Grimm. Because of this practice, prospective purchasers should take every means possible to learn whether seed is true to name before buying.

Baltic.

While the Baltic differs slightly from the Grimm alfalfa in some minor details, the two are so similar that it is seldom possible to distinguish one from the other, and the description as given for the Grimm variety applies equally well to the Baltic. Although there appears to be some evidence that the Baltic alfalfa produces seed somewhat more abundantly than the Grimm, in general the two varieties may be considered equally valuable.

As in the case of Grimm alfalfa the quantity of Baltic seed produced in the United States is rather limited, and the same precautions are necessary in purchasing it. From the evidence that is now available it is safe to conclude that seed of these alfalfas should be approximately the same price, and the farmer would not be justified in purchasing seed of one at any considerable advance in price over the other.

Canadian Variegated.

Because of the excellent showing made in the United States by certain lots of alfalfa seed procured from Canadian sources, the United States Department of Agriculture was led to make an investigation of the fields where the seed was produced, most of which are located in lower Ontario. Upon inquiry it was learned that at least part of the original stock came from France, and it is quite probable that some of it was from the sand lucern which is grown in that country as well as in other parts of Europe, since the strain as now produced has its characteristics, including variegated flowers. The fact that it is of hybrid origin, together with the natural selection that has taken place since its introduction into Canada, is responsible for its superior hardness.

Canadian variegated alfalfa is very similar to the Grimm and Baltic varieties as regards the color of its flowers and its general habit of growth. In fact, these strains are all so much alike that it is seldom possible to distinguish one from the other. It also compares very favorably with the Grimm and Baltic varieties in yield of seed and hay, but, like them, does not yield quite as much as common alfalfa where the latter can be successfully grown. The Canadian variegated has proved more resistant to cold than the common variety and is, therefore, adapted to the same general region as the Grimm and Baltic alfalfas.

Sand Lucern.

It is only during the last 25 years that any attention has been given to sand lucern in the United States, even in an experimental way, although there is little doubt that small quantities of such seed had reached this country many years previous. In 1889 it was grown in experimental plats at the Delaware agricultural experiment station; in 1891 at the North Carolina agricultural experiment station; and near Baton Rouge, La., in 1892. The first noteworthy trial with it was made in Michigan in 1897.

Sand lucern is a hybrid alfalfa and is undoubtedly the parent of our selected strains of variegated alfalfas, such as the Grimm, Baltic, and Canadian variegated. The sand lucern described by the early botanists is quite distinct from the commercial sand lucern. The former probably represents early-generation hybrids, while the latter has been modified by repeated crossings with the common alfalfa.

In general appearance the commercial sand lucern is very similar

to the common alfalfa. The presence of the yellow-flowered strain in its ancestry is indicated by the weaker and therefore more decumbent stems, by a certain amount of variegation in the flower colors, and by the presence of some pods with fewer and looser coils. In these respects, as well as in many others, it is quite similar to the Grimm and Baltic varieties.

The commercial sand lucern includes variegated alfalfas that have been grown under all sorts of conditions, and as a result the various lots show no consistent resistance to cold and drought. Some that have been grown for several seed generations under rather severe conditions have become, through natural selection, almost as resistant to cold or to cold and drought as the Grimm variety, while others grown under more favorable conditions are no hardier than the common strains.

The hardier strains of the commercial sand lucern are to be recommended for conditions similar to those under which the Grimm and Baltic varieties have given satisfactory results. The less hardy strains really have no place in this country, because where they succeed the common alfalfa will grow and give larger yields. Owing to the inconsistency in the behavior of the plants grown from various lots of seed, it is doubtful whether sand lucern should be recommended for general use, particularly since we already have other well-known varieties in the Grimm, Baltic, and Canadian variegated which are equal, if not superior, in hardiness, yield, and seed production to the very best strains of the commercial sand lucern.

Other Variegated Alfalfas.

The Cossack and Cherno varieties, which are not as yet commercially important, but which have received quite extensive advertising, belong to the variegated group.

These varieties are very similar, not only in appearance, but also in value. Since they are comparatively early generation mybrids, their characteristics have not become well fixed. They appear to be hardy and compare very favorably with other hardy alfalfas, but have given no indication of being superior in this respect to the Grimm or Baltic varieties. Only a very limited quantity of seed of either of them is available, and until their superiority over the best commercial hardy varieties and strains has been demonstrated farmers will not be justified in paying the high price that is now asked for the seed.

There are numerous other names that have been used locally in connection with alfalfas belonging to the variegated group, but they have not as yet attracted general attention.

Nonhardy Group.

There are certain alfalfas, distinct from the regional strains of common alfalfa, which have been developed in the northern part of this

country, that are especially characterized by long periods of growth and quick recovery after cutting. These alfalfas are so much more seriously affected by low temperatures than the other commercial varieties or strains that for lack of a better group designation they have been classed as nonhardy alfalfas. Commercially only two strains, the Peruvian and the Arabian, have ever attained any degree of importance in this country. Small quantities of seed of other varieties or strains, including the Guaranda and strains from Mexico (which resemble the Peruvian), and the Elche, Algerian, and Oasis (which resemble the Arabian variety), have been imported at various times but have never been grown extensively in the United States.

Peruvian.

In general characteristics the Peruvian alfalfa resembles the common variety, but it is sufficiently distinct to be readily distinguished. On the whole, the individual plants of the former are more upright, less branched, and have fewer and somewhat coarser stems than those of the latter. In thick stands, however, the two varieties differ but little in this respect. The leaves of the Peruvian are somewhat larger than those of common alfalfa, being longer and as wide or wider. The most striking characteristic, however, and the one by which this variety may be distinguished most readily is the pubescence, or hairiness, of the whole plant, giving the foliage a grayish appearance.

Peruvian alfalfa is characterized by its rapid growth, its quick recovery after cutting, and its ability in sections having mild climates to make growth in cool weather after the growth of ordinary alfalfa has ceased. Under such conditions it commences growth earlier in the spring and continues it later in the fall than do most other varieties, thus lengthening its growing period and thereby giving more cuttings per season. Peruvian alfalfa also possesses the advantage of setting seed more abundantly than most other strains, and in parts of the South it seems to be more resistant than other varieties to certain diseases. Its tendency to become coarse and woody when allowed to stand beyond the flowering stage may be considered a disadvantage.

Lack of hardiness will always confine the variety to the southern and southwestern portions of the United States, where the winter temperatures are comparatively mild. It can not be grown to advantage in regions where the temperature falls below 10° F. The variety is not drought resistant and therefore is not to be recommended for dry-farming sections.

As in the case of all alfalfas, the Peruvian variety crosses readily with other varieties when mixed or grown in adjoining fields. Such crossing has a tendency to result in the development of hybrid strains that do not possess the distinct appearance of the true Peruvian variety. This has given rise to the opinion that two strains of the Peruvian variety exist, one the hairy and the other nonhairy or smooth, and has brought about the use of the term "hairy Peruvian alfalfa."

Arabian.

In general appearance the Arabian alfalfa is not markedly different from some of our common strains, but is readily distinguishable. The plants are typically more hairy, a little shorter in growth, and somewhat more bushy than the ordinary alfalfa. However, the hairiness is not quite so pronounced as in the Peruvian alfalfa. The stems and roots are soft, the former being hollow and quite erect. The crowns spread little and set well above the ground. The leaves are generally larger, lighter colored, and broader in proportion to length than almost any other variety. The imported seed is unusually large, thus necessitating the use of a larger quantity per acre for seeding.

The Arabian variety is characterized by its quick recovery after cutting and by its ability to commence growth earlier in the spring and continue later in the fall than any other alfalfa. This makes it possible under favorable conditions to secure one or two additional cuttings in a year, but does not result in a corresponding increase in yield.

The greatest objection to Arabian alfalfa is its tendency to be short lived. Under ordinary field conditions a good stand may be maintained for two years. The third year the plants are less vigorous and the stand decidedly thinned out. The fourth year very few plants are left. Another objection is its poor seeding habits in this country, which render the variety difficult to perpetuate.

Yellow-flowered Group.

In this group are included the various forms of the yellow-flowered species, sometimes referred to as Siberian alfalfas. This term, however, is misleading, since not all of the yellow-flowered alfalfas come from Siberia. While these alfalfas are of comparatively little agronomic importance at the present time, they have been so extensively exploited that it is deemed advisable to discuss them along with the important commercial varieties of alfalfa.

The plants from these importations vary greatly in their characteristics, including habit of growth. Most of them are procumbent, while a few are nearly as erect as the ordinary purple-flowered alfalfas. Few, if any, of the forms possess true taproots, but have a much-branched root system. In general, the crowns are produced somewhat below the surface of the ground, a protective adaptation which enables the plant to endure cold and drought. The flowers are yellow, and the seed pods are crescent or sickle-shaped.

The Department of Agriculture has tested many forms of the yellow-flowered alfalfa quite thoroughly in various parts of the country. The results of these tests lead to the conclusion that their chief value is for hybridizing with the purple-flowered alfalfas in order to produce hardy and drought-resistant strains. It is believed that of themselves they are not sufficiently productive to be profitable under cultivation, since they rarely give more than one cutting in a season. Furthermore, most of

the forms are not sufficiently erect to be harvested for hay by field machinery, and almost without exception they produce seed very scantily. A few of the best forms of the yellow-flowered alfalfa give one cutting of hay that frequently outyields the first crop of the ordinary commercial varieties. However, the higher yield in this one crop does not offset their failure to produce more than one cutting in a year.

Summary.

At the present time there are recognized in the United States nine fairly distinct commercial strains of alfalfa varying in their adaptations to climatic conditions, some giving the best results in the North and Northwest, while others succeed only in the South and Southwest, where the winters are mild.

"Common alfalfa" is a term that is used to include all of the alfalfas that are not clearly of hybrid origin or that do not have distinct and uniform varietal characteristics, such as the Peruvian and Arabian varieties. Numerous strains are coming to be recognized in the "common" group. They are often designated by the geographic name of the locality where grown, as Kansas-grown alfalfa, Montana-grown alfalfa, and many others, or by some term descriptive of the conditions under which the crop has developed, such as dry-land alfalfa, irrigated alfalfa, and nonirrigated alfalfa.

Strains developed in the South usually produce larger yields than those developed in the Northern States, but they are less hardy. The "dry-land" alfalfa seed offered on the market has so far failed to show any noticeable superiority in ability to resist drought over that grown with an abundance of moisture.

The commercial Turkestan alfalfa has been tested quite thoroughly in all parts of this country, and in nearly every case has proved inferior to American-grown strains.

The leading commercial strains of variegated alfalfa are the Grimm, the Baltic, the Canadian variegated, and sand lucern. With the exception of sand lucern, they have been found more resistant to cold than other commercial varieties or strains and are therefore recommended for sections where winter-killing occurs frequently.

Peruvian alfalfa is not resistant to severe cold and can be grown successfully only where the winter temperature is comparatively mild, as in the Southern and Southwestern States. Under favorable conditions it outyields any other commercial strain.

Arabian alfalfa is not a satisfactory variety, because of its tendency to be short lived.

As a result of numerous experimental tests the adaptations of the various varieties and strains of alfalfa have been quite definitely determined.

It is highly advisable that the farmer should learn to distinguish good from poor seed. Plump seed of an olive-green color almost invari-

ably germinates well, while shriveled or brown seed generally germinates poorly. The presence of any appreciable quantity of weed seeds or other impurities indicates a poor quality of seed.

Owing to the fact that alfalfa does not produce seed satisfactorily under humid conditions, there is little use in trying to grow it for seed in the Eastern States.

Breeding work with alfalfa offers great possibilities, but the time and expense involved are so great that a farmer can not afford to undertake it.

Young Men and the Farm

By W. M. JARDINE,

(Director of Experiment Station and Dean of Agriculture, Kansas Agricultural College.)

The two greatest assets of any nation are its young men and the fertility of its soil. When these two assets are not properly linked together the nation is confronted by a problem that, if neglected, will surely lead to national disaster. The road which the country is traveling at the present time is leading a continually increasing proportion of young men away from the soil to other occupations. Since 1820 a steady fall in the proportion of the population in agriculture has taken place. At present only 32.9% of the population is agricultural, while in 1820 it was 87.1%. But that this is by no means as alarming as the fact that of those who are staying at the game of agriculture only one in five find any prospect of farming for themselves. From 1900 to 1910 the agricultural population increased by slightly more than 2,000,000, of which only 300,000 were farmers, while over 1,600,000 were farm laborers. In 1900 there was a hired farm laborer for every three farmers, while in 1910 there was one for every 2.3 farmers. These figures show one thing, that it is growing more and more difficult to become a farmer and thus that most of those who want to stay on the farm must be content to do so as mere farm laborers. Because of these discouraging prospects instead of our brilliant young men remaining on the farms an increasing proportion are leaving. The most productive part of a man's life falls in the age period of 20 to 54 years. If we examine the figures we find that so many young men have left the farm and taken up work in the city that the proportion in number of persons of ages from 20 to 54 years are 24% greater in the urban than the agricultural districts of the nation. This fact simply means that our neglect in devising some scheme for profitable linking together our young men and the soil has forced them to leave the farms and go where their prospects seem brighter.

The decisive period in a young man's life comes chiefly between his 20th and 24th years. He decides to leave or stay on the farm at this time. In the United States there are in the country districts two and a quarter million young men of this age most of whom find it unprofitable, yes, impossible to stay on the farm. Why is it? What conditions make this deplorable situation? Are the conditions becoming better or worse?

Why Young Men Do Not Stay On the Farm.

The ideal way to farm is for the farmer to own his land. Ownership is a stimulation that induces a man to do his best. It enables him to have a pride in his work and in the community because he intends

to stay in the same place year after year. Every young man has a natural desire to become the owner of a farm. It is one of the conditions upon which he will undertake farming. If the prospects of becoming an owner of the farm in a reasonable length of time are poor, he chooses some other line and quits the farm. The fact that such an increasing number of our young men are taking up work in the cities shows conclusively that their prospects of becoming owners are very poor.

The reason for this condition is clear. Very few young men inherit money soon enough to buy either land or equipment. They find that it takes too many years of labor as a hired man to save enough to become a tenant. In fact, of the decreasing number of young men who stay on the farms very few find it even possible to become tenants. The small number who become tenants find it a long task before sufficient savings can be made to make the first payment on a farm. Accordingly not only did the proportion of farm laborers increase in the last decade but the percentage of tenants rose from 35.3% to 37%. With the increase in tenants came also a decrease in the size of farms from 146.2 acres to 138.1 acres. Young men without capital leave the farm for two reasons, 1st, they cannot secure, under existing conditions, sufficient capital to stock and equip a rented farm and, second, on a rented farm it is well nigh impossible to save enough to buy land at present high prices, and in case they buy land, the interest rates on borrowed money are so high that it is almost impossible to save enough to extinguish the mortgage.

If we are going to connect up our young men with the soil we have got to do two things: Credit must be provided so that these young men can start to farm and the values of farms must be based on their use for productive purposes and not on an increased price based on an additional speculative value. If the prices of farms were based upon their value for actual farming without the added speculative price, then we should have a condition like this. A credit system suited to the needs of the farmer would enable young men to become tenants instead of remaining as laborers. Then as a tenant, since land would be lower in price due to no added speculative value, it would take a shorter period for him to save enough to make first payment and become an owner. Then again, as an encumbered owner, credit suited to the farmers' needs would shorten the periods required for saving enough to pay off the mortgage. If we do not establish a system for helping young men to connect up with the soil and then as rapidly as possible become owners, we are going to boost for an ever increasing percentage of tenants and for more and more farm laborers. The net result will be to drive more and more of our young men to the cities.

Why Tenant Farming Is Bad.

The building up of any community or district depends upon the interest and enthusiasm of the people who reside within it. It is unreasonable to expect any one who is coming and going to take either a great or a permanent interest in things which can not be taken with him when he leaves. Most tenants move every few years and Benjamin

Franklin's saying that "Two moves are as bad as a fire" is even truer today than in his time. A large capital invested in machinery and live stock which is essential to good farming, makes expensive moving, and since farm land is sold from under a tenant he has not the opportunity to sit tight even if he desires. Thus speculation is the predominant cause of moving which is a great factor in causing tenancy. Tenancy, therefore, being largely associated with grain farming without supplementary feeding of live stock is one of the chief causes of the depletion of soil fertility. But speculation, since it is the primary cause of tenant farming, is even more responsible for the exhaustion of our soil. According to a recent soil fertility survey of a number of representative counties in Kansas, just completed by the Chemistry Department of the Kansas State Agricultural Experiment Station, one-third of the original supply of soil fertility of the land has been dissipated in the production of some thirty odd crops. In other words, in less than a half century of farming, chiefly because of speculation in farm land and its evil influences on farming, one-third of the native fertility of the soil, a soil very rich to begin with, has already been exhausted. This is the part of the fertility most readily available. Information from the other states indicates a similar loss. In fact, already most of the states east of the Mississippi River and in the South are compelled to add several dollars of chemical fertilizer to each acre of their land each year in order to produce profitable crops.

Hand in hand with the increase in tenant farming and the dissipation of soil fertility is the increase in acre production. The acre production today, in spite of the fact that our knowledge of crop production and soil management has increased many fold over what it was 30 years ago, is becoming smaller every year and this with a corresponding increase in the cost of production.

We talk of co-operation credit, marketing and better rural churches and schools but figures show that the tenants take little if any interest in organizations of this character. Where two out of every five farmers are moving every other, or every third year, it is impossible to have a large enough number of people to organize really successful marketing organizations, or to keep up without prohibitive expense, the various church and school ideals. The result is a rapid movement toward a complete breakdown of these important institutions.

While all these deplorable conditions are developing, land values are growing higher. They have advanced in value from \$24.37 in 1900, to \$46.64 in 1910, or an increase of 91.4% in a decade, while there has been no increase in production. With these facts staring us boldly in the face, how is it possible to maintain a permanently profitable agriculture? Can we reasonably expect to build up a sound system of farming in America on a tenant farming basis? If the experiences of other nations, such as Germany and Denmark, are to mean anything to us, we most certainly cannot. In Denmark, authorities say that their wonderful co-operative achievements would have been impossible but for the system fostered by the government of promoting the farming of land by owners. In other words, tenancy in Denmark would have been ruinous to the institutions which have made her agriculture a success.

It is a mistake to expect that tenants will preserve soil fertility. The history of every nation has proven otherwise. It is to their economic advantage to mine it out as rapidly as possible for tomorrow they move on to another farm.

What Must Be Done to Enable Young Men Without Capital to Become Farmers and Owners.

If we, in the United States, are sincere in a desire to actually promote the farming of land by the owners and equally anxious to connect our wonderful resources of soil and young men, there are certain definite propositions which must be accomplished. We must have a credit system designed to meet the peculiar conditions of agriculture. Existing credit institutions, including the new land banks, are entirely inadequate to remedy the basic conditions which cause tenancy. Credit can in no way eliminate the speculative character because values can increase and do so sufficiently to off-set the help of cheaper money. For those, who are interested in doing away with the evils of tenancy, to expect fulfillment of their purpose by resort to better credit facilities alone, brands them as economic "quacks" just as it labels a medical "quack," or any doctor who prescribes a single remedy for all the ills of every patient. Credit alone cannot, and has never, eliminated tenancy in the face of high speculative values. It is, therefore, only a partial remedy to look to credit alone. The unfortunate thing about better credit moreover is the fact that it can do little if anything unless linked to some scheme for coping with speculative values.

How Can Speculative Values of Land Be Reduced?

For many years the United States has carried individual rights to such an extreme that social welfare has been cast in the background and with it the responsibility of maintaining soil fertility has almost been lost sight of. Speculation has been allowed to run free until the welfare of the nation is threatened. Either we will decide that some measure of limitation of individual rights must be established and the evils of speculation thus confined, or else we will continue to rob the land of its soil elements. The annual decline in productivity which we are paying as a price for freedom to traffic in land for its speculative values is a tremendous price. It is a tax in the form of reduced food supplies and diminished productive power for the future. According to the cumulative experience of New Zealand, Australia, Denmark, Germany and France, the only policy which will enable the linking of more of our young men with the soil as occupied owners, is to deal with speculation first and credit second. We must first limit the amount of land which one man can be permitted to own whenever land values take on a speculative character. This was done in New Zealand with universal approbation after the experiment had been placed in operation. The limitation is 640 acres of first class land. In order that the land of all persons owning over 640 acres be transferred to persons who will occupy it, a system of state repurchase is necessary. This should be administered by a non-partisan commission. Then in order to prevent speculation from entering into the transaction when the government buys the

land from private parties, there must be a thorough system of land valuation administered by a non-partisan board of experts and their valuations made the basis both of taxation and repurchase. The value of lands would thus tend to come down to their use for farm purposes in order that the owner avoid the perpetual payment of exorbitant taxes. In turn, the speculative value of such lands would be at the minimum when repurchase was made. Added to these measures for abolishing speculation, a credit system, shaped to meet the needs of farmers, would enable young men to consistently rise from laborers to owners and operators of farms. The government would conduct a policy of buying lands at a price based on productive values, selling them to energetic young men on the amortization basis, or leasing them in case they were without adequate funds for purchase. Only by such a scheme can the benefits of ownership be conferred on the individuals and the nation, and at the same time the evils of tenancy be reduced to a minimum.

REVISED

CONSTITUTION

OF THE

INTERNATIONAL DRY-FARMING CONGRESS

Adopted at Wichita, Kans., 1914, and Amended at Denver, Colo.,
1915, and at El Paso, 1916.

ARTICLE 1.—Name—The name of this organization shall be The International Dry-Farming Congress.

ARTICLE 2.—Objects—The objects of the Congress shall be: To encourage a better understanding of the principles of dry-farming and to cause the application of these principles in all regions where the annual precipitation is insufficient for the profitable production of crops under previously-known methods of agriculture, or where irregularity of rainfall results in severe drought during the growing season; to study practical agriculture and allied pursuits in such regions, and to collect and publish available data concerning the same; to urge closer relationship between the farmer and the national and state agricultural departments; to create and maintain a co-operative educational propaganda in behalf of agricultural development; to ascertain and furnish when desired, actual facts concerning the agricultural possibilities of all territory embraced in the work of the organization; and to discourage and prevent, as far as possible, all dishonest exploitation of land projects; to prosecute at all times the study of crops, soils, climate, precipitation, evaporation, the effect of altitude, latitude and general conditions, upon farming operations, and to disseminate the information so obtained; to provide a clearing house for the advanced ideas and information gleaned by the various national and state experimental stations, and to co-operate with said stations to the utmost extent; to encourage individual effort in developing the safer system of agriculture which has been and is being evolved by this organization and its members, and by others engaged in like work.

ARTICLE 3.—Officers.—The officers of this Congress shall consist of the President, Honorary Vice-Presidents and three active Vice-Presidents.

There shall be an Executive Committeeman for each State and Territory in the United States and for each Nation and Province represented by membership in the International Dry-Farming Congress; a Secretary and a Treasurer or an Executive Secretary-Treasurer, as may be deemed advisable to the Board of Governors.

The Executive Committeemen shall be selected by the delegations

representing the various States, Territories, Nations, and Provinces in the annual sessions of the Congress; and shall be submitted to the Committee on Nominations for report to the Congress. Vacancies may be filled by the Board of Governors either during or after the annual sessions of the Congress.

The Secretary and Treasurer, or Executive Secretary-Treasurer, shall be selected by the Board of Governors. The President and the Vice-Presidents shall be elected by viva voce vote or by ballot, a majority of the votes of all the members present being necessary to choice. Retiring Presidents of this Congress shall be ex-officio Honorary Vice-Presidents.

ARTICLE 4.—Executive Officers.—The Executive Committee shall elect its own Chairman. The Secretary of the Congress shall be the Secretary of the Executive Committee. The Treasurer may be required to furnish bond for the safe conduct of his office and shall make report to the proper officers or committee to be appointed by the Executive Committee at such times as may be designated. No indebtedness shall be incurred unless there shall be funds in the hands of the Treasurer to meet the same.

The Chairman of the Executive Committee shall designate a committee of nine, including the President of the Congress and the Secretary, which committee shall be known as the Board of Governors, and which board shall be empowered to transact all business of the Executive Committee during the interval between the annual sessions. The Chairman of the Executive Committee shall be the Chairman of the Board of Governors.

The Board of Governors shall meet at the call of the Chairman. Any three or more members of the Board of Governors may cause a meeting of the Board to be called at any time, upon reasonable notice, by joining in a signed request to the Chairman to issue such call. Five members of the Board of Governors shall constitute a quorum, one of whom may be a proxy.

During the interim between annual meetings, the Board of Governors shall have entire authority over all matters pertaining to the Congress, and may make and enforce such rules of procedure or by-laws as may be considered wise and expedient for the immediate conduct of the affairs of the Congress. The Board of Governors may delegate to the Chairman or to the Secretary of the Congress, such powers as it deems proper.

It shall be the duty of the Board of Governors to guard the welfare of the Congress in every particular; to use its best judgment and discretion in the making of contracts and the general business management. The Board shall do all in its power to preserve and increase the standing, dignity and prestige of the Congress, and to foster a policy of constructive growth.

The Executive Committeemen shall co-operate with the Secretary in establishing and enlarging the work of the Congress in their various

States, Territories, Nations and Provinces; and the Secretary shall submit all plans for local work in each such state, territory, nation and province to the Executive Committeemen for approval. Vacancies in any committee or office may be filled by the Board of Governors.

ARTICLE 5.—Annual Meetings.—Annual sessions shall be held at such time and place as the Board of Governors shall designate.

An International Soil-Products Exposition may be held in connection with the annual sessions, under the direction and management of the Board of Governors, or the Board may contract with a representative organization of the city which is to entertain the Congress, whereby the latter shall conduct the Exposition, in conjunction with the Congress management.

ARTICLE 6.—Offices.—The offices or headquarters of the Congress shall be maintained throughout the year, in charge of the Secretary of the Congress who shall have such assistance as is necessary in the discharge of his duties. As soon as the affairs of any Congress year are closed, the offices of the Congress shall then be moved to the city which is to entertain the next annual Congress sessions.

ARTICLE 7.—Board of Control.—The city which is to entertain the Congress next succeeding may organize a Board of Control or Committee, which Board shall represent the citizens of the state at large. The Board of Control may contract with the Board of Governors for the proper financing of such portion of the expenses of the Congress as may be agreed upon, and may arrange and furnish such quarters, facilities, etc., as shall be required, all upon an agreed basis.

ARTICLE 8.—Membership.—The annual membership dues shall be One Dollar, which shall entitle the member to participate in all sessions, and to receive each number of the monthly magazine. Official proceedings of the annual sessions shall be printed, and furnished to members on request, at a price to be fixed by the Board of Governors. Life memberships shall be issued at \$20 each.

ARTICLE 9.—Official Magazine.—Under direction of the Board of Governors, there shall be published a monthly magazine known as "Dry-Farming and Rural Homes," which shall be the official organ of the International Dry-Farming Congress. The expense of publication shall be paid out of the general fund of the Congress, and all receipts from subscriptions or advertising shall be placed in the general fund.

ARTICLE 10.—Amendments.—This constitution may be amended by a two-thirds vote of the delegates assembled in any annual session of the Congress.

AMENDMENTS ADOPTED BY THE TENTH ANNUAL CONGRESS, AT DENVER, 1915.

Name of Organization: That the name and title of this Congress shall be and remain "The International Dry-Farming Congress"; and the sessions of this Congress shall be organized and held under this title;

that for the purposes of the transaction of business by the governing body of this Congress, the incorporation of an organization under the laws of the State of Colorado, as perfected by the Board of Governors, is hereby recognized and approved; and the Board of Governors of this Congress shall act as and constitute the Board of Directors of said corporation, and shall direct and control the business affairs of the corporation as well as of this Congress.

Executive Committee: That Members of the Executive Committee shall serve for three years, or until their successors are chosen and qualify. Members of the Board of Governors shall serve for three years, or until their successors are chosen and qualify; provided, however, that following the close of the Tenth Congress, three members shall serve for one year each, three for two years each, and three for three years each; also provided, that any Member of the Board of Governors, excepting the President of the Congress, may be removed at any time by a two-thirds vote of the Members of the Executive Committee.

**AMENDMENTS ADOPTED BY THE ELEVENTH ANNUAL CONGRESS,
AT EL PASO, 1916.**

Members of the Executive Committee shall serve for three years or until their successors are chosen and qualify; provided, however, that, when the Executive Committeeman from any state is not present at Congress either in person or by legal proxy, the delegates attending the Congress may elect another Executive Committeeman to represent their state.

INDEX.

Appendix	121
Arizona—Response for	26
Bester, Col. A. J.—Address	57
California—Response for	21
Colorado—Response for	25
Cooley, A. C.—“Station Work in New Mexico.”	95
Constitution	
Drummond, W. I.—“Precipitation Has Not Increased.”	122
Eldridge, M. O.—“Going in Debt for Good Roads.”	77
Executive Committee	3
Fields, John—Address	38
Forbes, Dr. R. H.—“The Future of the Range.”	45
Introductory	5
Jardine, W. M.—President’s Address	17
Jardine, W. M.—“Young Men and the Farm”	
Kansas—Response for	28
Leidigh, A. H.—“Cotton as a Dry-Land Crop.”	67
Locations of Congresses	4
New Mexico—Response for	33
Nielsen, Niel—“Agricultural Development of Dry Lands.”	61
Oakley, R. A. and Westover, H. L.—“Commercial Varieties of Alfalfa.”	125
Oklahoma—Response for	29
Peterson, Dr. E. G.—“Serving the Farmer and Housewife Educa- tionally.”	42
Powers,—“Extension Work and the Cow Man.”	100
President’s Annual Address	17
Resolutions	91
Romagny, Consul J. M.—Address	64
Ross, John F.—“How the Station Helps the Farmer.”	89
Roster of Officers	2
Smith, H. Hamel—“Food Supplies During and After the War.”	106
South Dakota—Response for	31
Sweet, Lou D.—“Commercial Possibilities of Potato Growing.”	102
Taylor, Dr. W. E.—“Implements and Their Relation to Tillage.”	111
Texas—Response for	22
Throckmorton—“Organic Matter in the Soils of the Wheat Belt.”	74
Utah—Response for	24
Warner, Mrs. W. A.—“The Farm Woman’s Viewpoint.”	83
Youngblood, B.—“Live Stock and Its Importance on the Farm.”	53

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YOUR farm, at a price you can afford, on terms you can pay; not worn-out land in backward districts, or land that must be cleared, but fertile, virgin prairie in the most prosperous farming country in the world. That Western Canada's soil and climate are right has been proven at every Soil Products Exposition, where Canadian products are invariably winners. At the International Soil Products Exposition at El Paso, Texas, in October, 1916, exhibits from Western Canada were awarded:

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First Prize, Sheaf Alfalfa.
First Prize, Sweet Clover.

First Prize, Brome Grass.
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Mogul, kerosene and oil engines.

Low Corn King, Low Cloverleaf, and Low 20th Century manure spreaders.

Weber, Columbus, Steel King, Buckeye, and Sterling farm wagons and trucks.

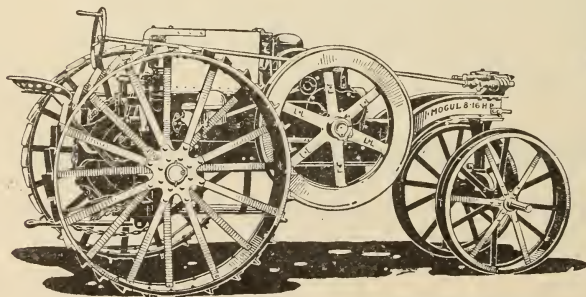
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Today, the American farmer enjoys the same facilities for instant,

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Aside from its neighborhood value, the telephone keeps the farmer in touch with the city and abreast of the times.

The Bell System has always recognized rural telephone development as an essential factor of Universal Service. It has co-operated with the farmer to achieve this aim.

The result is that the Bell System reaches more places than there are post offices and includes as many rural telephones as there are telephones of all kinds in Great Britain, France and Germany combined.



AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

One Policy

One System

Universal Service

IV

REPORT OF THE THIRD ANNUAL MEETING

OF

THE AMERICAN ASSOCIATION OF SOIL SURVEY WORKERS

HELD IN

UNION BUILDING, UNIVERSITY OF

URBANA, ILLINOIS

NOVEMBER 17 & 18, 1922

Report Issued From The Office Of The Secretary,
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Ames, Iowa

March 1923

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